

# THE AMERICAN MUSEUM JOURNAL

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# THE AMERICAN MUSEUM JOURNAL

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MARY CYNTHIA DICKERSON, *Editor*

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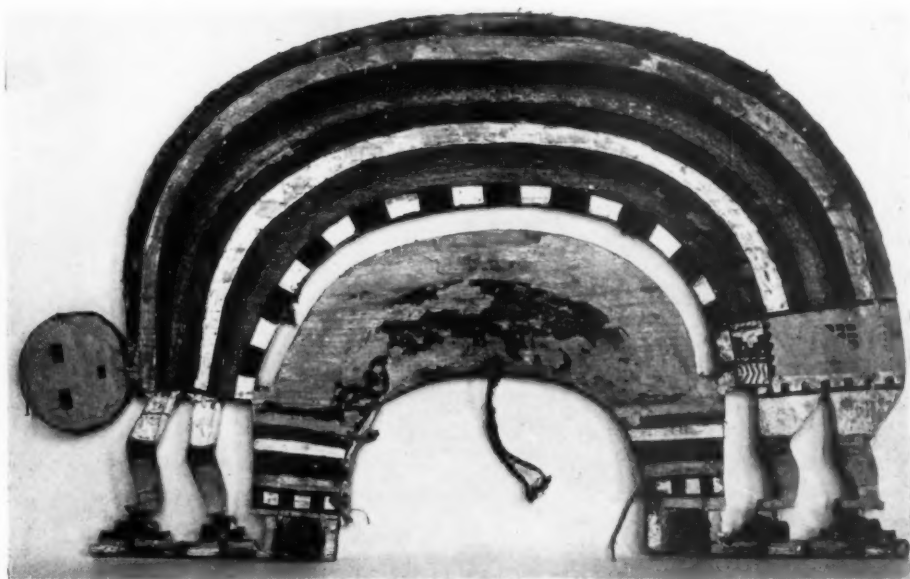
ARRAYED AS FOR THE SACRED TLAHEWE DANCE  
Miss Kathryn Deming of New York in native Zuni costume

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VOLUME XVI

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NUMBER 2



Symbol of the rainbow god worn on the head by a masked dancer impersonating the god

## The Oldest Town in America and its People

By A. L. KROEBER

Professor of Anthropology in the University of California

THREE hundred and sixty-six years ago the intrepid Spaniard Coronado marched a little army northward from Mexico across the deserts of Sonora and Arizona until in what is now the western part of the state of New Mexico, he found and conquered and occupied a group of Pueblo Indian towns whose fame had reached him under the designation of the "Seven Cities of Cibola," or Zuñi. As the years went on one or another of the seven allied towns was abandoned and its inhabitants moved to the central one of the group,

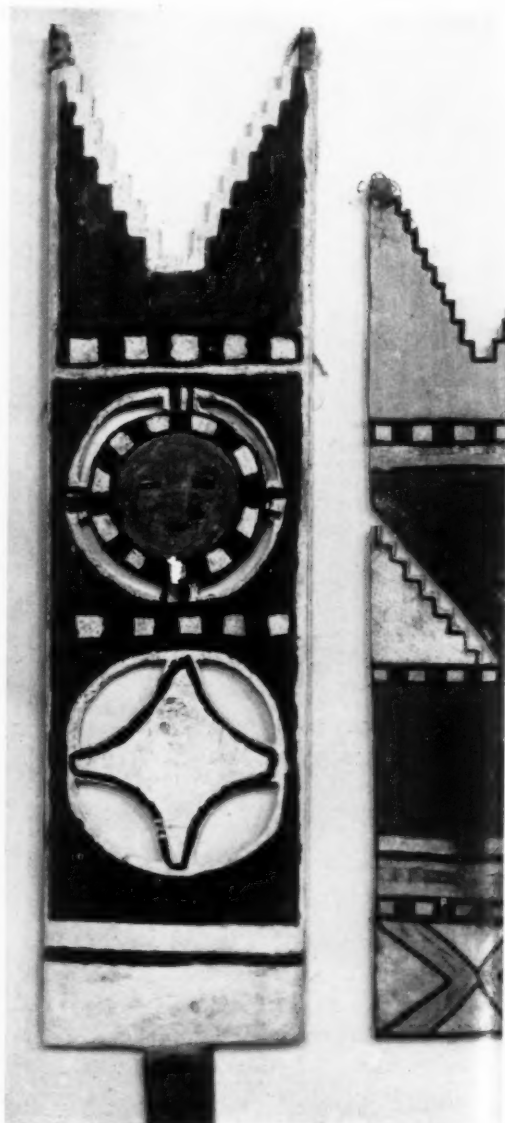
Halona, "Place of the Ants." For over two hundred years now, the whole Zuñi tribe has concentrated itself in this settlement which is known to Americans as the Pueblo Zuñi, and to its inhabitants as Ittiwawa, "The Middle Place," for in native belief its site marks the exact center of the earth.

With the possible exception of two or three other Pueblo settlements, Zuñi is thus the oldest inhabited town in the United States, far surpassing in antiquity Jamestown, Plymouth, and other early English settlements, as well as

Sante Fé and St. Augustine of Spanish foundation. The tribe numbers sixteen hundred souls or as many as it could muster after it had gathered itself together after the first disastrous shock of Spanish contact. The houses are still built in the prehistoric way of stone masonry, mortared and plastered with clay, and rise densely clustered, terraced one above the other to a height of four or five stories.

The life too of the Zuñi, runs in the current of long ago. They have borrowed from the American his shirt and his overalls, and have learned to like his coffee and sugar, his bacon and wheat flour. Sheep and donkeys they obtained long since from the Spaniard, and many today can boast of owning horses and wagons. But inwardly and in all his relations with other Indians, the Zuñi is still purely aboriginal. He does not know whether today is Sunday or Wednesday, whether it is January or July; or what the American names of the store-keeper, missionary and government agent are. He knows these people by nicknames which he or some friend has given them, and he reckons time by the number of days to the next ceremonial dance ordained by his priests. He supports himself as his forefathers of the immemorial long ago did, through raising corn by hand culture in sandy patches where it would seem that the grain would not even sprout. In the middle of the plaza around which his town is built stands a decaying, roofless and gutted Catholic church, which his forefathers built of adobe under the direction of Spanish missionaries; but two centuries of Christian régime have not influenced the inward spirit of the Zuñi. He knew that soldiers stood back of the priest and therefore he obeyed him, yet he hardened his heart against him; and no sooner did Spanish and

Mexican authority relax than the Indian quietly shook off the hateful yoke of imposed religion, and reverted openly to the ancient native ceremonials which he and his fathers had kept alive by secret practices in hidden underground rooms within fifty yards of the walls of the mission.

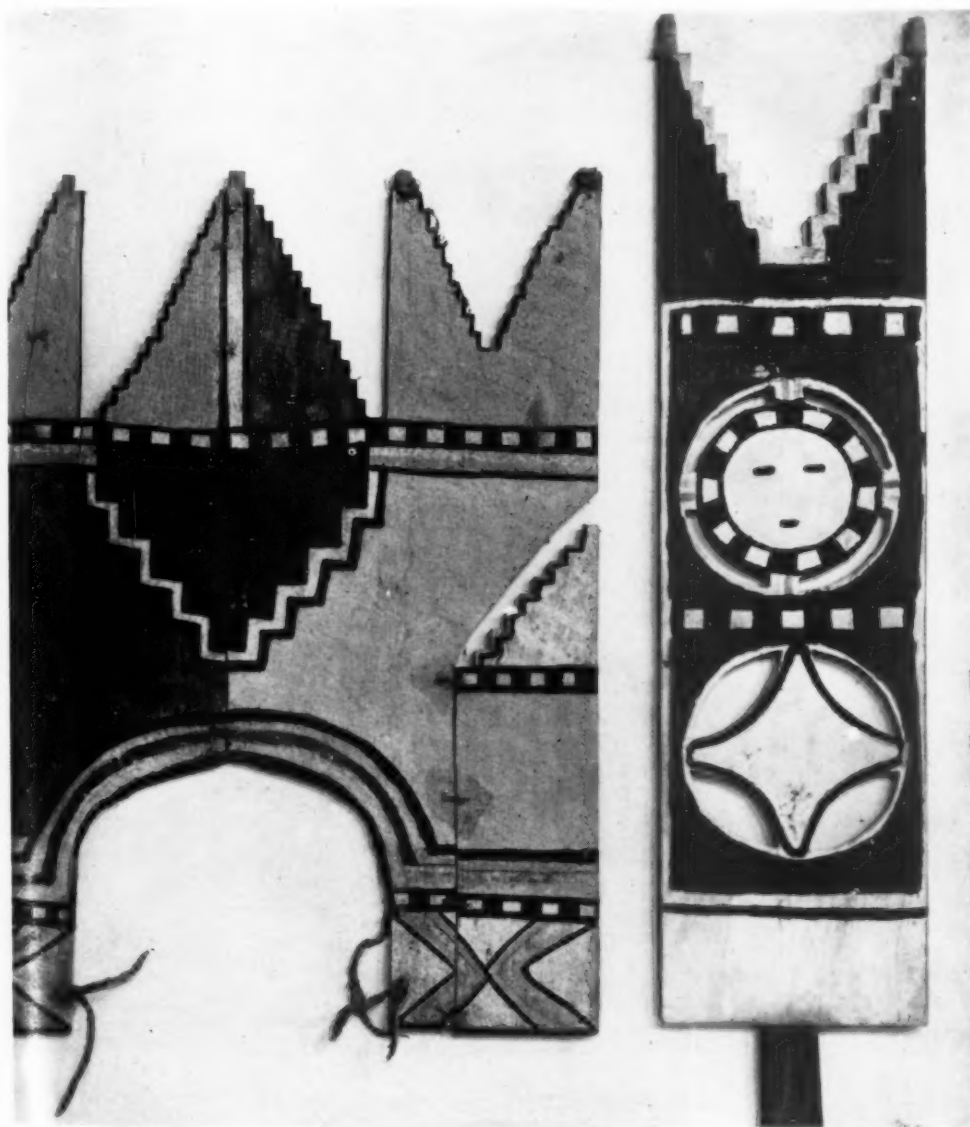


Painted dance tablets with sun, star and cloud symbols. There is never a month at Zuñi and at some seasons never a week without a public ceremonial dance, and every day brings some religious ritual

Such tremendously tenacious conservatism has kept the Zuñi substantially where they were before Columbus discovered America. They are not hostile to Americans, in fact their native code of politeness requires that every one should be treated with courtesy. They

are merely indifferent to ourselves. All that every Zuñi asks is that he should be left alone to support himself, to practice his religion, and to live his life as his fathers did, without interfering with any one and without being interfered with.

It is no wonder then that these



The Zuñi are tenaciously conservative. The Zuñi Indian even today reckons time by the number of days to the next ceremonial dance. All that any member of the tribe asks is that he should be left alone to practice his religion and live his life as his fathers did. On the relaxation of Spanish and Mexican authority the tribe reverted openly to the ancient native ceremonials, which had been kept alive secretly in hidden underground chambers



remarkable people have long attracted extraordinary attention from anthropologists and students of the aboriginal. Frank Hamilton Cushing, whose genius in certain directions has never been equaled among any of his colleagues, took up his residence at Zuñi nearly forty years ago, and became in every sense a full member of the tribe, looked on as such by the Zuñi themselves. He took part in their war expeditions against the hated Apache and Navaho raiders; became a member of one of the six sacred Kivas, and was initiated into the religious society of the priests of the bow. A host of other students have followed in his footsteps and the list of anthropologists

Wand swallowed by a medicine juggler of a religious society. The lower smooth portion of the stick is thrust down the throat for a length of fourteen inches

who have visited Zuñi includes most of the eminent names in America, such as Powell, McGee, and Mrs. Stevenson, to mention only some of those no longer living, as well as Tylor and other famous foreigners.

With all this study accomplished, one has however to be at Zuñi only a few days before being aware that our knowledge of the life of the people is very incomplete; in fact that in many respects the ground has scarcely been scratched. Mrs. Stevenson for instance has published a quarto volume four inches thick on the ceremonies and religious system of the Zuñi, yet any tourist in a week can see rituals enacted with full pomp to which she barely alludes. It is not that the studies that have been made are in their nature superficial. In fact many of the published accounts are intensive in their detail. It is the Zuñi life or culture that for all its aboriginality, is so intricately complex that no volume however thick could hold all that is to be said about any one of its several phases. No one knows exactly, but there must be nearly two hundred gods and mythological characters that are impersonated by distinctively masked and costumed dancers. There is not a month, and at certain seasons not a week, without a public dance in the town, and at no time a day without some sort of religious ritual.

The family life of the Zuñi is lived precisely as if no white man had yet set foot on American soil. The people are divided into sixteen clans each named after an animal or plant. Descent in these clans is not from the father as we inherit our names and as titles and royal succession descend in Europe, but from the mother. A Zuñi is of his mother's clan but he recognizes his relationship to his father's people by calling himself the child of his father's clan.





Sacred prayer meal bowl of a rain priest. Note the ornaments of frogs and dragon flies, symbols of water needed for the crops

Along with taking precedence over the men in carrying the group names, the women own the houses. A man may, by the labor of his own hands, erect a new house for his wife, from quarrying the rock to laying the roof, while she does nothing more than plaster the walls; yet let a divorce and separation take place, and the property unquestioningly belongs to her. The Zuñi are as monogamous a people as we. They look with repugnance not only upon polygamy, but also upon subsequent marriage with a former wife's sister or relative. At the same time, divorce is easy. Persons have only to separate. A man tired of

his wife leaves her. For a woman the procedure is not quite so simple owing to her property right in the house; but at that, she need only nag and abuse her husband until he takes his little bundle of clothes and returns to his natal home. If misplaced affection or stubbornness prevent him from taking the hint, she can have recourse to the more drastic method of simply installing his chosen successor, in which case nothing remains for the deposed husband but to leave quietly. It would certainly seem as if the Zuñi had long ago achieved for themselves some of the most radical portions of even the ultra-feministic program.





#### A RARE ANIMAL IN YELLOWSTONE NATIONAL PARK

There are only about one hundred Virginia or white-tailed deer in the Yellowstone, restricted to the lower Gardiner River and Tower Falls, and because of lack of suitable range, this species is not likely to increase in numbers here



White-tailed deer mother and fawn, Yellowstone National Park

## The Hoofed Animals of the Yellowstone<sup>1</sup>

STORIES OF THE WHITE-TAILED AND MULE DEER, BUFFALO, MOOSE, ELK, MOUNTAIN SHEEP AND ANTELOPE AS THEY THRIVE UNDER THE PROTECTION OF THE GOVERNMENT AND THE PEOPLE

By M. P. SKINNER

THE buffalo of the Yellowstone are divided into two herds known as the "tame herd" and the "wild herd." The tame herd had its nucleus in twenty-one bulls and cows purchased in 1902 from the Allard herd of Montana and the Goodnight herd of Texas. While three more animals were caught within the park and added, still the present herd of one hundred and eighty-five adults, and forty-nine calves born in 1915, is the original herd and its increase. This herd is maintained in the upper Lamar Valley where it is permitted to graze in care of a herder until the

forage becomes short in late December or early January; it is then driven into an enclosed pasture and fed on hay until the new grass makes its appearance. Fifteen bulls are driven down to Mammoth Hot Springs for the public to see during the season. While this is a "tame" herd it is just as well not to take too many liberties with it. Three of the soldiers from Fort Yellowstone with an investigating turn of mind became curious as to the reason for the "Dangerous" signs, opened the pasture gate and went in on foot. Some hours later the buffalo keeper found them enjoying the scenery from a pine top with an angry buffalo pawing the ground underneath.

<sup>1</sup> Illustrations from photographs by the Author, made during a residence of twenty years in the region.

The "wild herd" is the remnant of the vast herds that once inhabited our plains and were driven back into the mountains by advancing civilization. Owing to poaching and the difficulty of protection under the laws then existing, it decreased until only twenty-two animals were known to be in Yellowstone Park in 1902. In July, 1912, a special effort resulted in counting forty-nine animals, and the number is now believed to be about seventy. Evidently this band will multiply if given adequate protection. The word "wild" is a good one; for these are the wildest of the wild, never permitting the approach of horse or man, living in the remotest portions of the park, and wintering at an elevation of eight thousand feet amid the hot springs of the Pelican Valley. Here they manage to gain a scanty living from the grass freed from snow by the interior heat. Aside from deep snow this valley is a good place for them, affording as it does good protection from the bleak, wintry winds that sweep across the park plateau. In summer they have ample grazing in secluded nooks.

Throughout the southern part of the park and particularly in the valley of the upper Yellowstone River, live the moose. Living the farthest south of their kind and isolated among the mountains, it is hardly to be wondered at, that here has developed a peculiar form known as *Alces americanus shirasi*. The number is conservatively estimated at six hundred. Since these animals are slowly spreading to other parts of the Yellowstone and are found even far to the south of Jackson Lake, it is evident that they are increasing. Observations at the center of abundance seem to confirm this. These moose are found mainly upon the broad willow-covered, marshy bottoms of the upper Yellowstone, Snake, Falls River, and Gallatin valleys. Feed-

ing upon the willows and a few scattered quaking asp, as well as upon the aquatic plants of the numerous beaver ponds, their supply of food is plentiful. Their habitat is a secluded one and they have

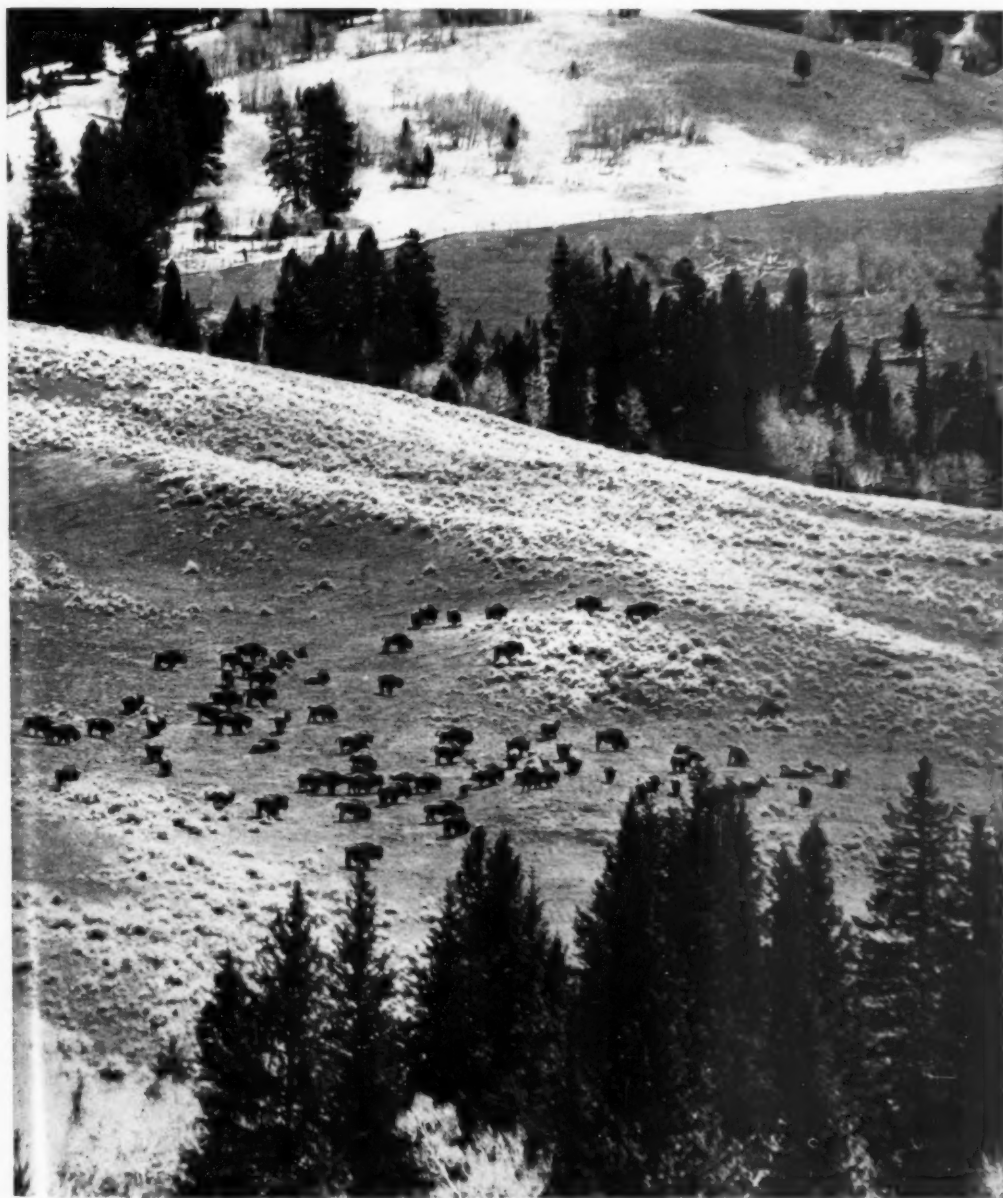


The remnant of the vast herds of buffalo that roamed our plains in years past occupies Yellowstone Park and is known as the "wild herd"

no enemies within the park. The outlook for the preservation and increase of this herd is good.

But the mammal that has taken most kindly to the park is the elk. Orig-

nally living far out on the plains and at a much lower altitude, the elk seems to have adapted itself to its forced retirement to these mountain fastnesses, until now the region we are discussing



This "wild herd" was reduced in 1902 to only twenty-two members, through difficulty in proper protection under laws existing then. In 1912 there were forty-nine and in 1915 about seventy. These buffalo are very wild and never permit the approach of man or horse. They winter at an elevation of 8000 feet in Pelican Valley

contains the only large herd that is left in the country. Nor is it here only that we observe the adaptability of this deer. Coming as no doubt it did from Asia by way of a land or ice bridge across Bering Strait, the elk or wapiti, the largest of the round-horned deer, gradually spread to all parts of what is now the United States, except perhaps the extreme southwest, thus enjoying a wider range than any other American mammal with the possible exception of the black bear. It is a similar adaptability that is seen in the behavior of the captured elk. For this herd furnishes a surplus of a thousand elk a year which are caught and shipped away to supply preserves and zoölogical gardens. It takes only three or four days to tame these wild animals so that they can be shipped and handled in small lots as easily as cattle. Yet, such are the anomalies of Nature, this animal (together with the wild buffalo) is the only one to fail to respond to the protection the park affords; it is still as wild as ever and the tourists have difficulty in believing the tales told them of its abundance. And it is abundant: careful estimates of the northern herd place its number at thirty-seven thousand, and there are other herds at the heads of the Madison and Gallatin rivers and along the southern boundary of the park. Probably forty thousand head winter within the park and seventy thousand spend the summer there. In severe winters, food for these elk becomes hard to get, for they eat grass, browsing upon willow and quaking asp only when forced to do so. They feed then in the open "grass country" of the northern section of the park where the elevation is low and the snow not so deep. From November to April they can be seen by thousands in the Black-tail, Hellroaring, Slough Creek, and Lamar valleys. On one ride of ten

miles last winter a horseman counted eight thousand four hundred and forty-three elk in the Lamar Valley. Frequently they appear close to the buildings about Tower Falls and occasionally come even among the buildings at Mammoth Hot Springs. So many are seen on the surrounding hills from Gardiner that they cause no comment. But in summer, the heat combined with the flies drives the elk high up the mountain heights and they are then in the natural pastures at timber line. This habit together with their wildness makes them hard for the tourist to find. The elk have some enemies within the park. The panthers and the coyotes get a few of the young, and the wolves get many of the adults as well. As yet the damage is not severe and it is hoped the authorities can hold these marauders in check. In one or two instances these wild elk have been "tamed" by being fed. As usual with members of the deer family, familiarity with man soon makes them dangerous. At times workmen have been forced to climb trees to get away from these tamed elk even when the elk was a female without horns. Hence attempts at taming have been discouraged. An interesting stage in the elk's life is that immediately following birth. In the latter half of May and early June the cows separate from the herd and retire to the quaking asp and willow thickets of the low valleys. Here the young elk are born, usually a single calf, but sometimes there are twins. The new calf is dark brown, covered with white spots; the long, ungainly legs are so weak that the little elk can stand or walk only a few moments at a time. For the first few days the mother hides her youngster in the brush whenever she leaves it to secure food for herself. The little elk so hidden sticks so closely to his hiding place that one can approach



and even touch him. Touching him however breaks the spell and he totters off on unsteady legs to find his mother, sometimes squealing like a little pig as he goes. In the course of a week or ten days the muscles become stronger and the legs more serviceable; the mother then leads her one by easy marches toward the summer ranges away from the heat and the flies which are beginning to be bothersome.

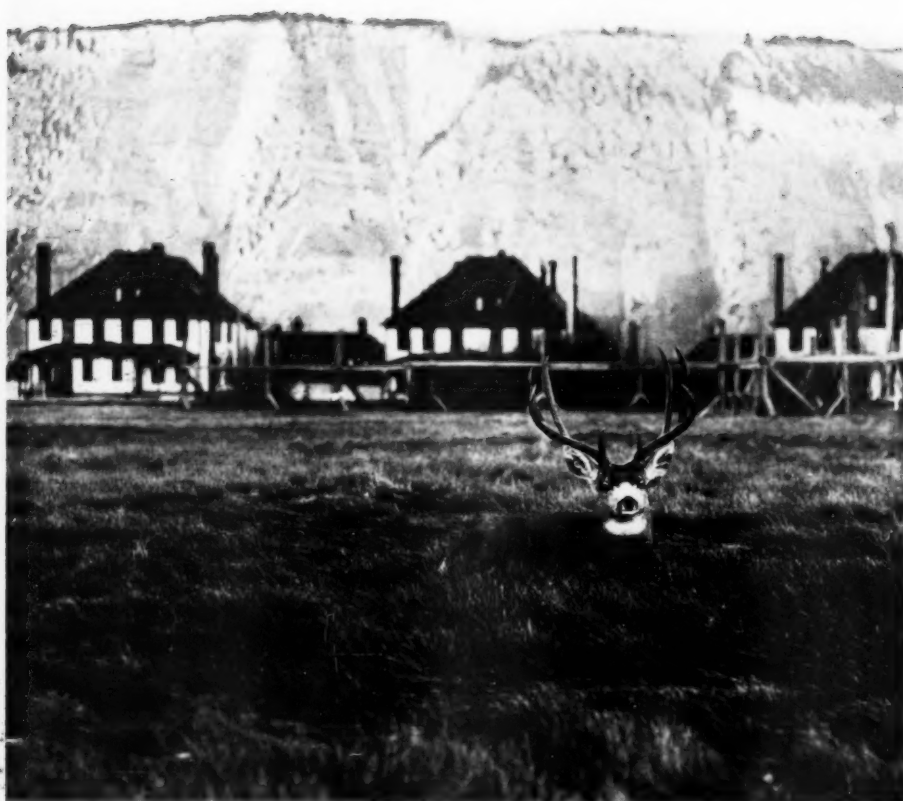
Another animal that is widely distributed throughout America, and one that was very important as a meat supply to our pioneer forefathers is the Virginia or white-tailed deer. Here in the Yellowstone it is rare, only about one hundred being known to exist. As its range is restricted however to the lower Gardiner River and to a small section about Tower Falls, it is frequently seen. Moreover its natural sagacity has led it to appear in numbers at Mam-

moth Hot Springs in winter where it is fed hay by the park scouts. This deer is naturally timid and spends its time hidden in the heavy alder and willow thickets where it finds seclusion and plenty of browse. It has no enemies except an occasional panther; but owing to lack of suitable range within the Yellowstone it is improbable that it will ever increase in numbers.

The mule deer however, has a different status. This is the deer known throughout the Rockies as the "black-tailed deer," although the name ought to be restricted to the Columbian black-tail of the coast states. It is preëminently a deer of the open, frequently seen on open, sage-brush hills; and even when it does go into timber, it is apt to select open pine and fir forests in contrast with the thick brushy woods that the white-tailed deer prefers. Estimated conservatively at twelve hundred, it has



Bull moose crossing a beaver dam. The moose in Yellowstone are living farther south than any other moose of the country. They number some six hundred and there is splendid prospect for their protection and increase



Tourists at Mammoth Hot Springs are certain to see the mule deer or common black-tailed deer of the Rocky Mountains. This species is conservatively estimated to number twelve hundred in the park, and is rapidly increasing. It is fed in severe winters and the park scouts keep up a war on its enemy, the panther

increased in the last few years, and shows signs of extending its range throughout the park. Its present center of abundance especially in winter, is Bunsen Peak and the immediate vicinity of Mammoth Hot Springs. The flourishing condition of this species is no doubt due to its being fed in severe winters and to the war waged upon its only dangerous enemy the panther—puma or mountain “lion” as it is locally known. The spreading of hay has brought this deer about Mammoth Hot Springs in large numbers, and it becomes so tame that most tourists see at least a few. Indeed it is about the only hoofed mam-

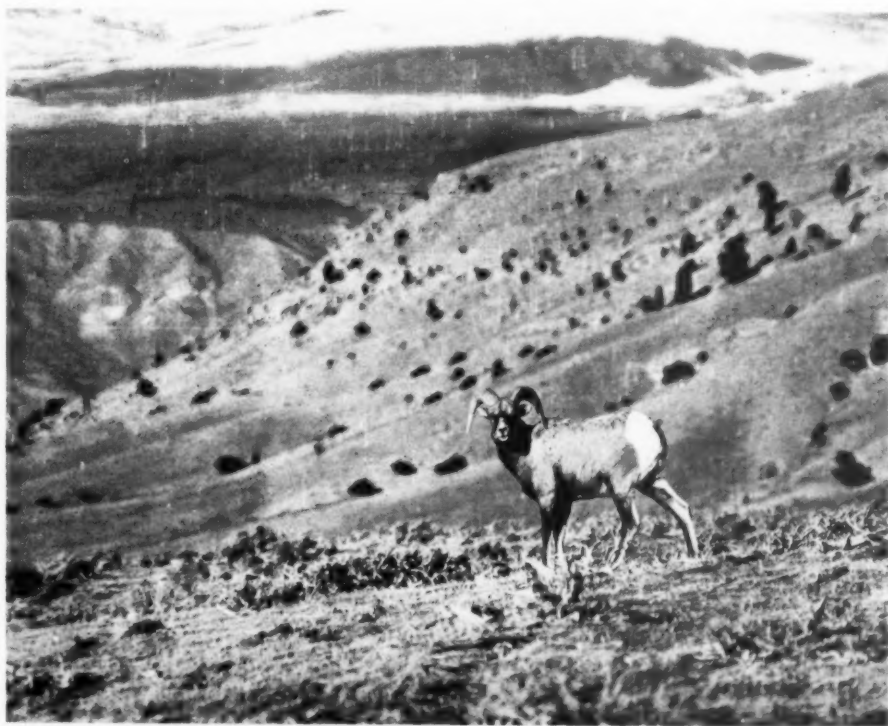
mal that the hurrying tourist can see along the much traveled main routes. Being a deer of the open, carrying its head high, and having noble branching antlers, it is bound to attract attention whenever seen. During the summer season a mother deer with her two, and sometimes three, daintily spotted, beautiful little fawns always wins the admiration of even the most blasé tourist. At such times it is curious to note that the little fellows exhibit their natural timidity; often the fawns will glance up at their mother as if to make sure that she sees the strange creatures in front. Many are the stories of the deer’s



tameness. It is the accustomed thing for troops of deer to make the round of the kitchens at Fort Yellowstone getting a biscuit here, a bit of lettuce there, at the next house perhaps a turnip or a beet. For years one large and particularly fierce-looking buck came habitually to the trooper's quarters for scraps from the table.

The bighorn, or Rocky Mountain sheep, is one of the notable sights of the Yellowstone Park. Retiring as it does in summer to the tops of the highest mountains, some effort is required to reach its haunts. But when it makes its appearance near the coach road on Mount Washburn, or when the winter storms drive it to the lower levels, then one has the opportunity of making the acquaintance of this most interesting

mammal. Within the park limits it is very tame and illustrates to a marked degree the changes that protection has worked in this wild, timid, hunted animal of the old days. The scouts spread hay for it all through the winter along the main road up the Gardiner River cañon. There are at present about two hundred and fifty in the park, but they do not seem to be increasing at a satisfactory rate. Yet they seem to be breeding well and many lambs are seen each year. The panthers get a few and possibly coyotes catch some of the lambs; still the habit of the sheep to keep near cliffs and their climbing abilities, protect them from these foes. It is possible that the sheep go outside the park and being unafraid, fall easy prey to the hunter. While sheep are perhaps the least inter-



The bighorn or Rocky Mountain sheep is very tame in the Yellowstone. It retires to the tops of the highest mountains in summer, being able to climb up and down steep cliffs at high speed; in winter it may be driven to low levels by severe storms. There are thought to be some two hundred and fifty bighorns in the park

esting to watch, yet the ever-changing mountain scenery amid which they dwell, often rewards the searcher for sheep even when no sheep are found. At times the sheep are found at low elevation, as for instance along the cañon edge at Tower Falls; or on heights easily reached, as on Specimen Ridge. Nevertheless they are never far from cliffs toward which they can flee in times of danger. As usual with animals living in such places, they are accomplished climbers, often going up and down cliffs at high speed where an experienced mountain man would not care to follow at any speed however slow. If they slip, they do not seem to care but somehow manage to catch footing farther on. While all the hoofed animals fight among themselves to some extent, the mountain

sheep in this respect are in a class by themselves. Not only do they fight all winter and summer when the deer and elk are quiet and peaceable; but they are continually at it merely for the fun of it; even lambs a few months old spend minutes at a time charging and butting. While the battles of the deer are usually either twisting or pushing matches, the sheep charge each other at full speed; springing into the air just before meeting, they come down and together with a terrific crash. Again and again they draw apart for another try; and again and again they come together with all the force that is in them.

But the most interesting of all the Yellowstone animals is the pronghorn or antelope. An object of curiosity and controversy among scientists since the

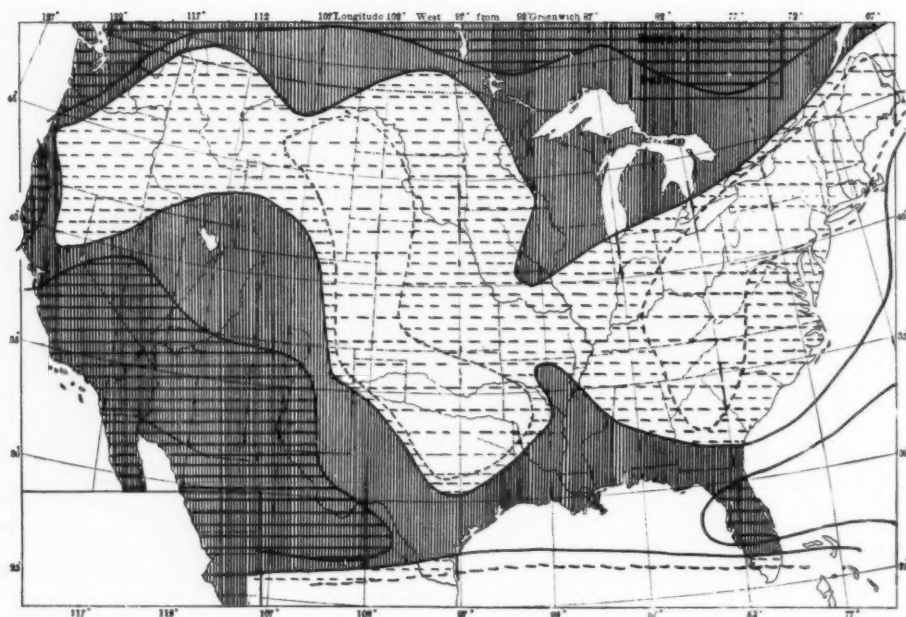


The pronghorn or antelope is most interesting of all the hoofed animals of Yellowstone National Park. The fate of the antelope depends on the preservation of the Yellowstone herd, some six hundred animals — a difficult problem, for antelope are wild and heedless of danger. The herd was reduced a few years ago by the escape of fifteen hundred across the northern boundary of the park where they disappeared as though the earth had opened to receive them. The park scouts give more attention to the antelope than to any other of their charges

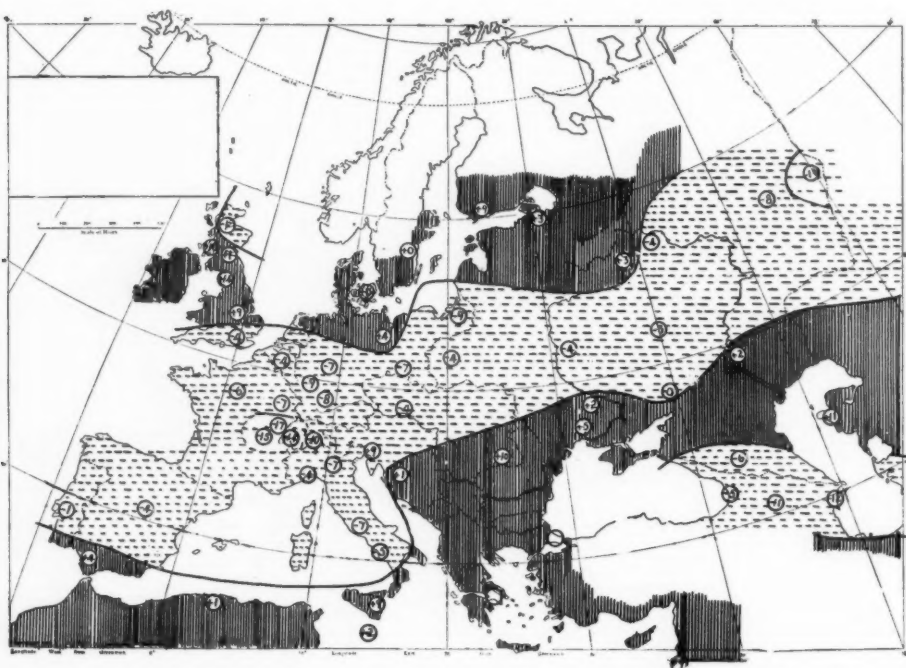
day it was first described, the antelope steadily challenges the attention of all — so different is it from all other existing animals and having so many strange habits. Even to this day there are many plainsmen who deny that it sheds its horns. Since the day on which the great Audubon drew attention to this peculiarity by denying that such a thing could occur, to the present day, arguments pro and con have been tossed back and forth through the pages of our outdoor papers. Yet it is not a matter for argument at all. It is a fact that the antelope does shed its horns as regularly as any deer. As in other matters, so here, the antelope has its own method. The only hollow-horned mammal known to shed, it sheds only the sheath of the horn, leaving the bony core with a new sheath already growing upon it. The horns are lost in November, as against February for the white-tailed deer, March for the mule deer and April for the elk. The new sheath grows so rapidly that the wild antelope with partly grown horn is seldom seen. And the cast horn itself is eaten by mice, chipmunks, gophers, coyotes and even by antelope themselves. Our pronghorn, as the name shows, is noted for having the horn branched. The hair too is remarkable and feels like excelsior, being coarse and stiff. An animal of the open, the eyes of the antelope are on the side of the head and are unusually keen-sighted. This being so, a strange object is noted at once and the antelope's great curiosity leads to an investigation at once. The writer was once bird-hunting in Wyoming in a region where antelope were very wild and scarce. There was no antelope in sight at the beginning of the hunt; yet a large white

English setter ranging back and forth after his quarry served to draw a male antelope up to within a hundred feet, although two men and five horses were there in plain sight. The more the dog attended to his own business, the more curious the pronghorn became. The antelope trusts to its own fleet legs for escape, never entering timber if avoidable. It does not thrive in a zoölogical garden, and will not breed in a small enclosure. Hence the fate of the species hangs upon the preservation of the Yellowstone herd. There are now six hundred antelope in it and they are slowly increasing. But they present a hard problem. The young are harried by the coyotes; perhaps the larger wolves also get a few. Wild as they can be, yet so heedless of danger that they are constantly trying to leave the park never to return. A few years ago fifteen hundred head got out across the northern boundary, scattered and disappeared as if the earth had opened and swallowed them. Appreciating the great value of this herd, the authorities spend more time and money upon its care than upon all the rest of the Yellowstone animals together. Fed every day in winter in corrals especially constructed to admit only the antelope, the winter range patrolled twice a day, a dozen men employed destroying coyotes and constant watch kept in summer — such is the measure of the care taken of this, our most unique mammal.

The white or Rocky Mountain goat has never been seen within the Yellowstone; nor is there any evidence that it was ever there. It is true that the goat is a more northern animal, yet the park plateau is elevated and at least some of the ground seems suited to its needs.



Comparative storminess in the United States at times of maximum and minimum sunspots.— *Heaviest shading* indicates more than 24 per cent excess of storminess at times of sunspot maximum. Remainder of *heavy shading* indicates less than 24 per cent excess at maximum. *Light shading* indicates less storminess at times of many spots than at times of few. In the *most lightly shaded* areas the deficiency is more than 12 per cent. The diagram is based on the reports of the United States Weather Bureau since 1876 [Quoted from description of map in Huntington's *Civilization and Climate*]



Comparative rainfall of Europe at times of maximum and minimum sunspots.— *Heavy shading* indicates more rain at times of many sunspots than at times of few; *light shading* the reverse. Numerals indicate percentage of excess or deficiency in terms of normal rainfall. Diagram based chiefly on Hellman's data, 1850-1900, and on Russian meteorological reports [Quoted from description of map in Huntington's *Civilization and Climate*]

# Prediction of Climatic Variations

CAREFUL RESEARCH ON CLIMATIC DATA BY THE COUNTRY'S BEST METEOROLOGISTS MIGHT SOON SAVE THE PEOPLE OF THE UNITED STATES BILLIONS OF DOLLARS BY PREDICTION OF STORM OR DROUGHT MONTHS IN ADVANCE

By ELLSWORTH HUNTINGTON

Professor of Geography in Yale University

THE influence of slight climatic variations upon man's prosperity and happiness is almost beyond belief. In the year 1912 the average rainfall in the state of Kansas during the month of July was 2.56 inches. That year the corn crop had a value of \$69,700,000. July is the critical month for corn. In other months only enough rain is needed to keep the corn alive and growing, but when the silk is coming out and the ears are making their chief growth, there must be plenty of moisture or the crop is ruined. In 1913 the July rainfall averaged only 1.31 inches. Although the acreage of corn was practically the same as in 1912, the corn crop was worth only \$18,270,000. A difference of a little more than an inch of rainfall in July, with unimportant differences in the preceding and following months, made a difference of \$41,430,000 in the amount of money received by the farmers those two years. According to the census of 1910, there were 178,000 farms in Kansas, and in 1912 and 1913 there may have been 180,000. Therefore the average farmer received about \$230 less for his corn in 1913 than in 1912, and all because of an inch of rain in July. Think of the difference that it would have made to the Kansas farmers if in 1913 they had been able to prevent or forestall the loss of \$230 apiece. Many of course lost far more. Consider the difficulties of those who found themselves without money for new machinery,

for their children's education, for the interest on the mortgage, for new clothes and shoes, and for a hundred other necessities.

Kansas is only one state out of forty-eight, and corn is only one crop out of scores. If we take all the crops and all the states the total value in an exceptional year like 1915 rises to ten billions or more. Even when there is no war the value rises easily to eight billion dollars in good years, while in poor years it may not be more than five or six billion. Most of this difference is due to variations in the weather, which influence not only the corn crop, but also everything else that grows in the soil. The weather has a pronounced effect also on the number of eggs and amount of milk produced, the number of young animals that survive, and the weight of the older ones that are slaughtered. Suppose that a difference of a little over two billion dollars is due to the weather. That would mean that on an average each of the seven million farmers of the country has \$300 less in poor years than in good. To the average farmer such a sum means all the difference between prosperity and adversity; between the ability to improve his farm and lay by money, and the necessity for neglecting his farm and running into debt.

If variations in the character of the seasons from one year to another frequently do two billion dollars' worth of damage to this country, how much is it



worth to find out why such variations take place? We cannot of course change the weather, but if we know why one season differs from another, we can probably discover a method of predicting such differences months in advance. If we could do that, how much would it be worth? Take Kansas as an example. Suppose that the farmers were informed in January that the chances were four out of five that the following summer would be dry, what good would it do them? The wise farmer would at once begin to lay his plans. In the first place he would curtail his expenditures so as to save up a little against the hard season that would follow. Next he would gradually get rid of his surplus live stock in order not to be obliged to carry it over a winter when the price of feed would be high. Then he would plan not to plant much corn, although on the wettest part of his land he might perhaps plant a little on the chance of local showers which would give him a good crop at high prices. If he were wise however, he would not bank largely on that. In the next place the farmer would plan to sow millet or some other crop which can stand more than the usual degree of aridity. Finally he would agree with a neighbor that for that season one of them would run both farms. The other would seek work in some part of the country where unusually favorable weather was predicted, and where all the farmers would be eager to hire help in order that they might plant as much land as possible. Now and then a man who followed this method might see his more foolish neighbors more prosperous than himself, because the predictions would occasionally be wrong, but a man who consistently heeded the predictions year after year would surely prosper in the long run. His income would be com-

paratively uniform, no matter what the weather might be. It is easily possible that \$500,000,000 per year might be saved to the country if such a system of long range predictions were thoroughly worked out and applied. Even if only \$100,000,000 could be saved each year, it would be worth while to spend millions to achieve the result.

If several hundred million dollars could be saved to the country each year by a knowledge of the cause of climatic variations, the farmer would by no means be the only gainer. Everyone knows that if the farmers are prosperous, the rest of the country follows suit. That is why intelligent people look with such keen interest at the government crop reports. How closely the rest of the country is dependent upon the farmers has recently been shown most effectively by Professor Moore of Columbia University. He has compared the average prices of all commodities with the average value of the crops produced per acre. He has made full allowance for the fact that the methods of farm cultivation have improved during recent decades, and also for the rise in general prices due to the increased production of gold and its consequent decline in value. His results show unmistakably that the productivity of the soil determines the prosperity of the country. The process is simple. When the crops are good the farmers have plenty of money, and buy new furniture, automobiles, ploughs, shoes, fancy groceries and all sorts of manufactured articles. The retailers soon sell out their stock and begin sending orders to the wholesalers. The wholesalers wait a little to see if the orders continue and then send orders to the factories. After a short time the factories get so many orders that they begin to increase production. All the operatives are at

work long hours each day. Thus they too have more money than usual, and begin to buy freely. That stimulates business still more. Meanwhile the railroads are busy because the crops supply abundant freight, and the goods consumed by the farmers give the roads something to carry back. On all sides business booms and the country prospers. There may of course be over production, or troubles of other kinds, but these rarely bring grave and prolonged disaster unless the crops are poor. When the crops fail every sort of activity declines. The farmers are the foundation of prosperity; their prosperity depends on the weather; hence the weather is the greatest of all factors in determining whether business in general shall prosper and pay good dividends. By saving the farmer, we shall also save the whole country.

If the value of long range weather forecasts is so great, why have we made so little progress in finding out how to make them? Can we ever, indeed, hope to make much progress? To answer these questions we must inquire into the state of our knowledge of the causes of climatic variability.

The old hypothesis, and the one that is today most generally accepted, is that "the wind bloweth where it listeth, and thou hearest the sound thereof, but canst not tell whence it cometh and whither it goeth." In other words, the differences which we continually observe between a wet season this year and a dry season next year are thought to be due to chance. An accidental combination of circumstances may cause a swing, now in this direction and now in that. If this were the case, long range predictions would be out of the question. We might possibly progress so far as to predict in weeks where we now predict in days, but there would be no reason-

able hope of being able to predict months or years ahead. Thoughtful meteorologists however, have rarely been fully satisfied with this hypothesis. They have been convinced that the observed changes are too extensive to be so nearly accidental. Hence there has been a constant search for underlying principles.

One result of this search has been to bring to light some interesting minor causes of climatic instability. For example, Pettersson, the director of the Swedish Hydrographical-Biological Survey has discovered that the strength of the tides, which varies regularly in a cycle of about eighteen years, has an influence upon the amount of water that comes into the Baltic Sea from the ocean. This in turn has an influence upon the surface temperature of the Baltic, and thus upon the degree to which the winds blowing from it are warmed or cooled. Again, Humphreys, Abbott and Fowle have shown that the presence of volcanic dust in the air after explosive eruptions, such as that of Krakatao in 1883, shuts out a certain amount of sunlight and slightly lowers the mean temperature of the earth's surface. The effect is slight however, and cannot be the main cause of climatic variations.

Since the sun is the source of heat, there has always been speculation as to how much this heat may vary and what effect may thus be produced upon the earth's climate. As the sun's activity varies in the sunspot cycle of about eleven years, there has been a strong tendency among persons untrained in meteorology to suppose that changes in the sunspots may be the direct cause of exceptional seasons. Reasonable as this supposition appears upon its face, it has not found much support among professional students of climate until within a few years. The reason is that there



are all sorts of apparent contradictions. For instance, it has been proved beyond question that when sunspots are numerous the temperature of the earth's surface is lower than usual, and that it rises steadily toward a maximum at the time when the sunspots are at a minimum. This looks like a clear case of solar control of terrestrial climate. To be sure the difference between the temperatures at maximum and minimum spots is scarcely a degree Fahrenheit, but that is enough to be significant. The apparent agreement between sunspots and temperature however, has been more of a puzzle than a help in solving the problem of the causes of climatic changes. Careful measurements of the sun's radiation at several observatories have shown beyond question that when sunspots are numerous, the sun sends out *more heat* than usual, whereas the earth is *cooler* than usual.

Many similar contradictions are found. For instance, tropical hurricanes increase in close harmony with the number of sunspots. The same is true of tropical rainfall in general, when the whole torrid zone is considered. In individual areas however, the opposite condition is found to prevail. Again, the level of Lake Michigan has been carefully recorded for many years. When it is compared with the sunspot numbers from 1860 to 1915 the two go up and down approximately together from 1860 to 1872; then they disagree markedly for eight years; next they go together for twelve years or till 1890; again there is a disagreement for about eight years; then comes agreement for thirteen years until 1911; and finally four years of disagreement. That is, the lake level and the sunspot numbers vary in fairly close harmony for about thirty-eight years and fail to agree for about eighteen years. There is enough

agreement strongly to suggest a real relationship, but enough disagreement to warrant grave doubts.

Still another puzzling feature is found in the degree of storminess in the United States. The statistics of the Weather Bureau show quite clearly that when sunspots are numerous there are more storms in the United States as a whole than when the spots are few. In Arizona on the one side and in southern Canada on the other, the figures for successive years bear this out; but in Kansas the opposite is true, for the number of storms tends to decrease in years of many spots. Obviously we are dealing with a very complex matter.

Another type of relationship between the sun and the earth has been found by Arctowski. From a careful study of many records he finds that temperature, barometric pressure, rainfall, and other meteorological conditions vary regularly in little cycles having a length of from two to three years. These variations are so uniform in widely separated latitudes and longitudes that they can scarcely be due to anything except some outside cause such as the sun. Moreover they seem to agree with some of the minor fluctuations of the sun, such as the prominences, as has been shown by See. Here again there seems to be an unquestionable connection between the earth and the sun, but it also is beset with contradictions. In certain areas Arctowski's little variations, which he calls pleions, lag behind the standard series which is most clearly developed in tropical countries. What seems to happen is that certain parts of the earth's surface where the sun is shining with full force, for instance the equatorial zone or the interior of a continent during the summer, become highly heated when the sun is unusually active. The heat thus received moves slowly

outward in the form of a wave. Such waves move irregularly in various directions and with differing speeds. It is possible to trace them, provided enough work is done in the way of tabulating and mapping the weather records.

Let us return now to the question of sunspots and climate, for the sunspots are the most important solar variation that we are yet familiar with. The contradictions that have been described above are not really so contradictory as they seem. They are perhaps explicable on the following hypothesis. When sunspots are numerous the earth receives more heat than usual, and there is also a greater degree of electrical activity, as is known from many years of observation. These two conditions, either separately or together or in conjunction with other conditions not yet understood, lead to unusual storminess and to an uncommonly rapid circulation of the air. Practically all storms are of a cyclonic nature. This does not mean that they are tornadoes, for to the meteorologist the word cyclone merely means a vast slow-moving whirl, or area of low pressure extending over hundreds of miles. Such whirls, or storm areas are surrounded by inblowing winds, while in their centers great volumes of air move slowly upward. This air is always comparatively warm. Therefore it drains the heat away from the earth's surface. Hence if storminess increases, the amount of warm air that goes upward must also increase. This perhaps accounts for the fact that when sunspots and storms are numerous the earth's mean temperature falls.

The apparent contradiction between the relation of sunspots to storms in Kansas and in Arizona or Canada, is another case where careful study shows that a definite law is at work, although the cause is not yet understood. Kull-

mer has drawn a series of maps showing the areas where storms increase or diminish at times of many or few sunspots. He finds that when sunspots are numerous there is a tendency for storminess to increase in the Southwest from southern California to Texas, and also in the North along the southern border of Canada. In the center of the country however, from Oregon southeastward to the middle Mississippi and then northeastward to New England, the storminess tends to decline. The average location of the areas of increase and decrease may be seen on the accompanying map taken from the author's volume *Civilization and Climate*. The heavily shaded areas are the places where storminess increases at times of many sunspots. Essentially the same conditions are found in Europe as may be seen in the lower map. When sunspots are numerous the areas around the North and Baltic Seas are stormy, and the same is true in a southern belt around the Mediterranean. The intermediate areas, on the contrary, are unusually dry at such times.

The phenomena shown in the maps repeat themselves with each sunspot cycle. The exact limits of the shaded areas however, by no means remain the same from cycle to cycle. The southwestern area of increased storminess in the United States contracts or expands; the tongue that projects southward near Lake Michigan sometimes lies west and sometimes east of its average position. This accounts for the disagreement already described between the level of Lake Michigan and the sunspot numbers. In general the shaded area lies over the lake's drainage basin. So long as that is the case the water rises when sunspots are numerous and falls when they decline. Sometimes however, the tongue shifts so far to

one side that the reverse conditions prevail.

Still another element of complexity is added by the fact that when storminess increases at times of many or few sunspots as the case may be, the increase occurs at different seasons in different parts of the country. Thus in northern Germany storms increase in summer but decrease in winter during times of many spots. In Winnipeg there is an increase from January to March and again from July to November, while farther south in the same latitude there is an increase in April and May, but a decided decrease from July to November. Other parts of the world show still other peculiarities, yet everywhere there seems to be a definite law at work, if only we could discover it.

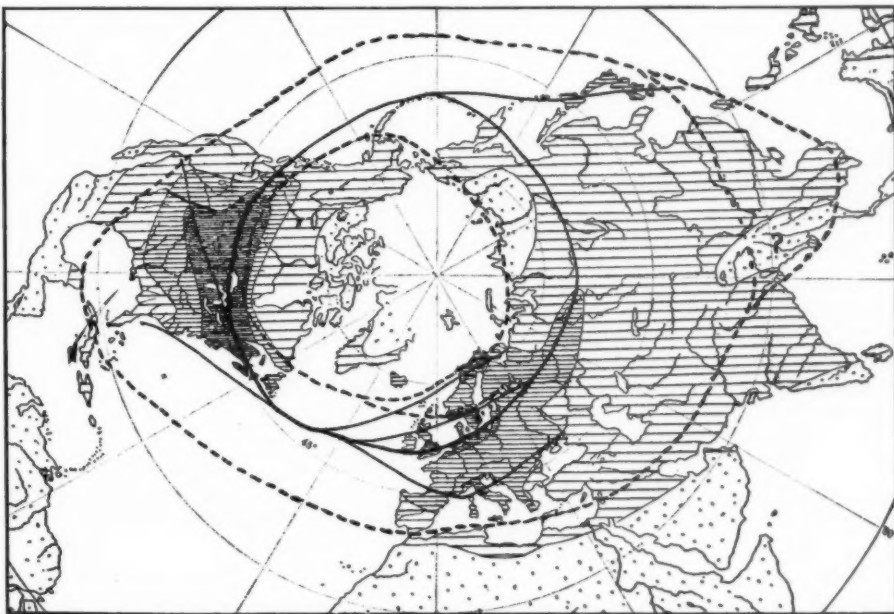
From all this it appears that in spite of seeming contradictions there is a distinct relationship between sunspots and the variations of the earth's climate from season to season. The relationship is highly complicated because it is not direct, but arises through a readjustment of the atmospheric circulation. It is further complicated by the fact that there are several kinds of solar variation, each of which exerts an influence. For instance the minor cycles of two or three years discovered by Arctowski, seem to take place independently of the sunspot cycles whose average length is about eleven years, but which may vary from seven to fifteen years. In addition to these two kinds of cycles there are known to be others of greater length, as well as little ones having a periodicity of a month or more. All these many variations are in progress at once, one tending to upset the earth's climate in one direction and another in another. The final results as they impress themselves upon man are the product of a great number of cycles,

which sometimes conflict and sometimes reinforce one another. To these must be added the influence of terrestrial conditions like tides and volcanic eruptions. No wonder the problem of long range weather predictions is difficult.

Although the problem is difficult, it is far from discouraging. Within the last few years such progress has been made that we may well be hopeful. The great difficulty is lack of investigators. The sun's nature and changes are being minutely investigated by such agencies as the Smithsonian and Carnegie Institutions. When the new hundred-inch telescope on Mount Wilson near Los Angeles is completed we may expect a great enlargement of our knowledge of the true nature of sunspots, solar prominences, and other solar phenomena, and the meaning of the results thus obtained will quickly be discovered by a corps of highly trained observers. The other side of the problem — that is, the collection of climatic data, is being carried on unceasingly by the world's weather bureaus, among which our own holds an unrivaled position. There is one great deficiency however, which the officials of the United States Weather Bureau are the first to deplore. As a nation we are obsessed by the idea that we must be "practical." The result is that the short-sighted American people is willing to spend millions of dollars in gathering figures and in finding out how much rain there is, how early the frosts come, and a multitude of other useful matters, but begrudges any money for finding out why these things occur. This foolish country of ours thinks nothing of spending a thousand dollars apiece for a thousand clerks to record figures, but it squirms and says "impractical" at the mere suggestion that five thousand dollars apiece be appro-

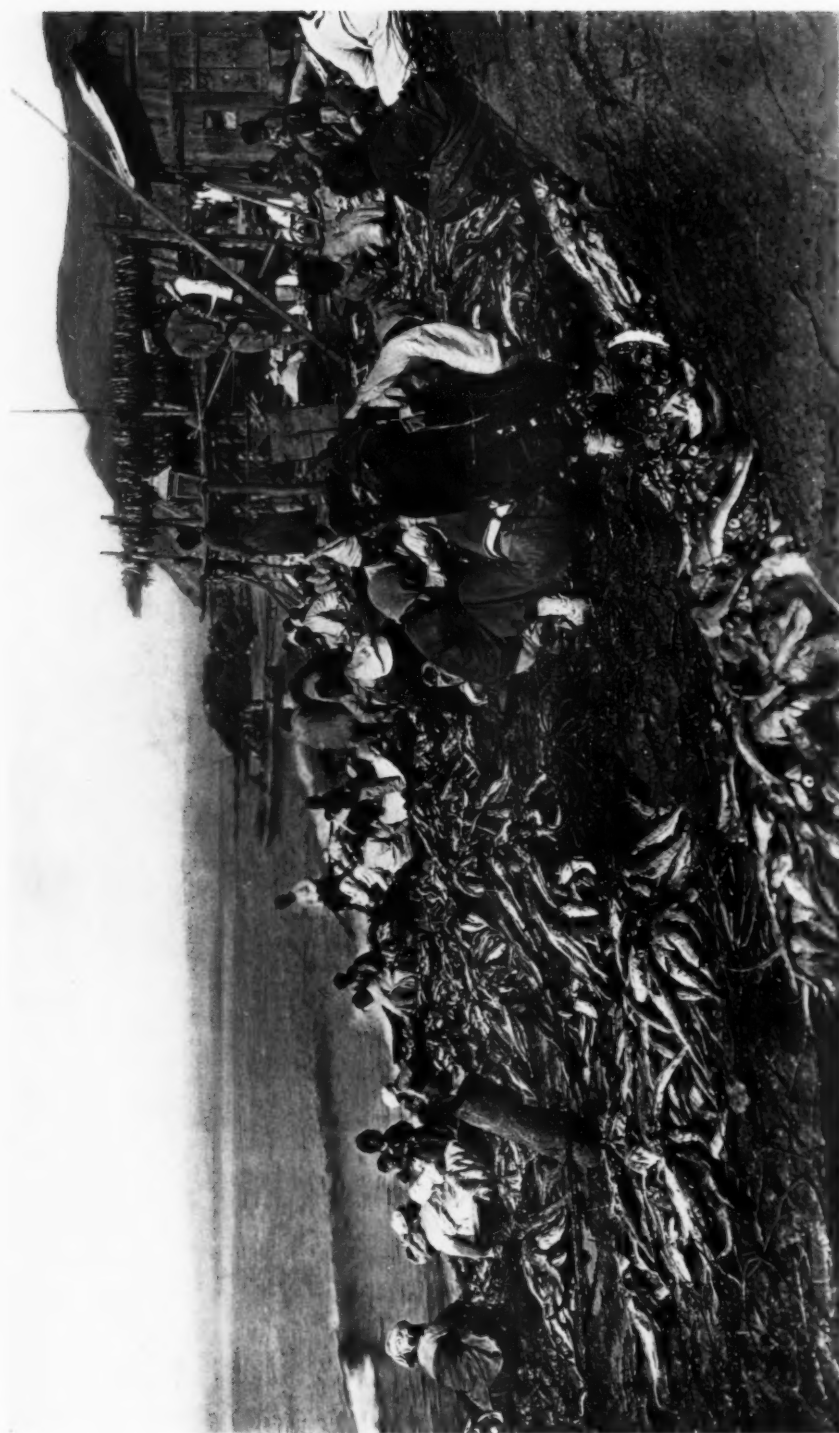
priated to pay the salaries of half a dozen real investigators whose work would be merely to ponder on the figures gathered by others and extract from them the inner meaning. The officials of the Weather Bureau deserve all praise for the large amount of investigation that they carry on, but the great majority of them have to do it as a by-product. Their time is mainly taken up with routine work which tires the mind and leaves it too much exhausted for the arduous work of framing and testing hypotheses. The far more valuable work which many of them might do is relegated to the time that they can snatch from their other tasks or from evenings and vacations. If Congress

could be persuaded to let the Weather Bureau put five or six of the country's best meteorologists to work on the problem of the causes of climatic changes and to devote all their time to it with suitable clerical assistance, there is little doubt that within ten years we should be far on the way to the prediction of the weather months in advance. Some day we shall doubtless achieve that result even under the present handicaps, but the country would be vastly richer if it would hasten the result by encouraging its Weather Bureau to engage in abstruse studies which may not appear practical now, but which in the end will lead to the saving of millions and billions of dollars.



*Darkest shading, regions of maximum storminess; next darkest, moderate storminess; lightest shading, very slight storminess; dotted areas, without cyclonic storms. Median lines of the main storm area and its branches are indicated by heavy solid lines; the hypothetical median lines of the ancient storm belts are shown by dotted lines.*

Changes of climate in the past have consisted largely of variations in the location of the storm belt — In the past and today no nation has risen to the highest grade of civilization except in regions where the stimulus from storms is great; the distribution of civilization closely follows the distribution of climatic energy [From *Civilization and Climate*]



#### FISHING SCENE IN KOREA

Korean natives at Seshin in northeastern Korea, cleaning a catch of *men-lai*. This fish is very abundant and is a staple food of the country. After being partially dried by hanging on poles in the sun, it is sent all over the Empire and forms the basis of the favorite native dish *kimpshi*—the taste and odor of which are peculiarly repugnant to the outsider



# The Asiatic Zoological Expedition of the American Museum of Natural History

By ROY CHAPMAN ANDREWS

PROBABLY no region of the world is of more zoölogical interest than central and eastern Asia, for it was there that many of our most remarkable mammals originated. It is also believed by eminent authorities that there will be found somewhere in the vast Thibetan region north of the Himalaya Mountains, remains of the earliest types of men, who doubtless followed the large mammals which eventually spread into Europe and America. The study of Asiatic zoölogy has therefore an especial interest.

The natural approach to central Asia, for geographical reasons if for no other, is by way of China where the American Museum's Zoölogical Expedition will begin its work. Until 1907, when the British Museum dispatched the Duke of Bedford's expeditions to northern and western China under the leadership of Mr. Malcolm P. Anderson, our knowledge of the fauna of this country rested principally upon the work of the two Jesuits, Pére David and Pére Huede, and upon that of Messrs. Robert Swinhoe and A. Milne-Edwards. Pére David's collections, made more than fifty years ago and containing many important types, were largely sent to the Paris Museum. The Duke of Bedford's expeditions yielded the first extensive modern collections of Chinese mammals and focused zoölogical interest on China. As a result, a number of large expeditions and several sportsmen went into this attractive region, discovering many animals new to science and throwing light on many of the dark spots of Asiatic zoölogy.

Although Yun-nan in the west, adjoining Burma, had been visited in 1868 and 1875 by Dr. John Anderson, and scattered localities in the provinces of Fo-kien and Kwang-tung had yielded a few small collections, most of the vast region lying south of the Yang-tse River remains at the present time practically an untouched field. The wild and mountainous province of Kwei-chau in the far west is probably the most interesting of all and is certainly one of the least known; part of it is thinly populated by a so-called independent tribe, the Miao-tse, who themselves have been but little studied.

The American Museum's expedition will spend considerable time in Kwei-chau and will make a reconnaissance of the other unstudied provinces south of the Yang-tse River — as far as circumstances will permit.

After visiting Peking, to obtain letters to the viceroys of various provinces, the expedition will proceed to Foochow, a large city on the coast between Shanghai and Hongkong, near which some time will be spent hunting with Mr. Harry R. Caldwell in an endeavor to secure specimens of a tiger which he believes to be new to science. Mr. Caldwell, who is an excellent amateur naturalist and has done much tiger shooting, writes under date of November 9, 1915:

I have been especially anxious to obtain skins of a certain species of tiger which I have discovered in the wilds of these mountains. This is a handsome beast with a maltese ground color. I have been prevented from getting a specimen of this variety only by lack of time. I fully expect

to get one however, as I have them definitely located, having made careful studies of specimens at short distances on a number of occasions.

Whether or not this tiger will really prove to be an unknown variety, it is of course impossible to say until specimens have been obtained, but it offers interesting possibilities.

Mr. Caldwell has also described other animals unknown to him, one of which is undoubtedly the white-maned serow (*Capricornis argyrochaetus*).

Perhaps the most striking of all Chinese mammals is the beautiful golden-yellow takin (*Budorcas bedfordi*), discovered in the province of Shensi by one of the Duke of Bedford's expeditions.

The takin is a strange animal inhabiting the wild mountain heights of a strange country. It is allied to the serows and gorals and may possibly be found in Kwei-chau for it has been recorded from the mountains to the westward. The serow and goral are especially interesting since they are in many respects intermediate between the sheep and the goats. Among the carnivores to be found are leopards, bears, foxes and mongooses, while monkeys, squirrels and many important small mammals will undoubtedly be secured.

The expedition will proceed into the interior by way of the Si-kiang, or West River. A boat can be secured at Canton to carry it to the head of navigation. Along the river, mammals, birds, fishes and reptiles will be collected; then the expedition will make its way into the mountains by means of mules and native porters.

A complete camera equipment will be provided and attention directed toward securing motion pictures of the animal and native life of the regions visited.

For this work the expedition is especially fortunate in securing a remarkable motion-picture camera which has been invented by Mr. Carl E. Akeley of the American Museum staff. During his long experience in Africa Mr. Akeley was continually in need of a motion-picture camera adapted for the difficult work of photographing wild animals. Because no such camera was to be had, Mr. Akeley characteristically set to work to design one, and the result will undoubtedly revolutionize the taking of wild-game motion pictures. A unique feature of the photographic equipment will be color photography. By the Paget process, a negative plate is secured from which both color paper prints and color lantern slides can be made.

The expedition will leave New York March 17, and will sail from San Francisco March 25 on the Japanese ship Tenyo Maru, due to arrive at Yokohama April 10. Some time will be required to outfit and to conclude the necessary diplomatic negotiations, so that collecting will probably not begin until about the second week of May. Unless unforeseen circumstances arise to change the plans, one year will be spent in actual field work.

The Asiatic Zoölogical Expedition has been made possible through the Jesup Fund of the American Museum and by the personal subscriptions of friends of the Museum. The patrons are Mr. James B. Ford, Mr. and Mrs. Sidney M. Colgate, Mr. Childs Frick, Mrs. Adrian Hoffman Joline, Mr. Lincoln Ellsworth and Mr. and Mrs. Charles L. Bernheimer.

It is to be hoped that the results of the Museum's endeavors in this new and remote field will yield collections and scientific data worthy of the generosity with which the expedition has been supported.



**REPRODUCTIONS IN DUOTONE OF  
PHOTOGRAPHIC STUDIES MADE ON AN AMERICAN  
MUSEUM EXPEDITION TO ASIA**

**PHOTOGRAPHS BY ROY CHAPMAN ANDREWS**



**DENSE WILDERNESS OF LARCH IN NORTHWESTERN KOREA**

The trees are hung with long gray mosses which form a curtain overhead. The Museum's expedition of 1912 traveled six hundred miles through this forest, which had not before been traversed by white men. The entire southern two-thirds of Korea has been completely denuded of forests, but the Japanese are now beginning the work of reforestation



#### WHERE KOREA AND MANCHURIA MEET

Looking up the Tumen River, which forms the northeastern boundary between the mountains of Korea and the vast, rolling steppes of Manchuria. All this region is rocky and mountainous, affording little opportunity for agriculture. The photograph was taken on the Museum's expedition of 1912, which penetrated into hitherto unexplored parts of northeastern Korea and southern Manchuria



#### SHRINE AT HEISANCHIN, ON THE YALU RIVER

The old city of Heisanchin was built on the top of a natural hill which rose out of the river plain, and was the scene of many battles between the Koreans and Manchurians. The original city has now entirely disappeared save for a few crumbling walls, an old gate, and this picturesque shrine. The new city of Heisanchin, built by the Japanese, is on the plain below



#### THE GREAT WALL OF CHINA AT THE NANKOW PASS

Through this pass formerly ran the principal caravan route into Mongolia, and even today many picturesque caravans come this way to Peking. The great wall, fifteen hundred miles long, on the boundary between China and Mongolia, dates from the third century B. C., but the greater part of the present wall was built in the fourteenth century. Averaging twenty-two feet in height and twenty feet wide, with towers every hundred yards, it is the most gigantic defensive work in the world, but is now for the most part in ruins except where it guards an important pass



### THE AVENUE OF THE ANIMALS

Gigantic monuments lining the road to the tombs of the Ming Emperors of China at Nankow, near Peking. Ancestor worship prevails in China, and tombs are very important as being habitations of the immortal dead. These marble effigies of many different animals are ranged across the open valley, to represent, as it were, all the creatures of the world mourning the death of the Mings. There are four representatives of each animal, two standing and two sitting. They form an avenue two miles long





#### ON THE ROAD TO THE MING TOMBS

One of the great animal figures hewn out of a single block of marble — the guide standing beside it is almost six feet tall. Each emperor of the Ming dynasty, which ruled China from the fourteenth to the seventeenth century, was given an elaborate shrine, approached through an avenue of these marble animals



#### KOREAN GUNBEARER, WITH PURPLE AZALEAS

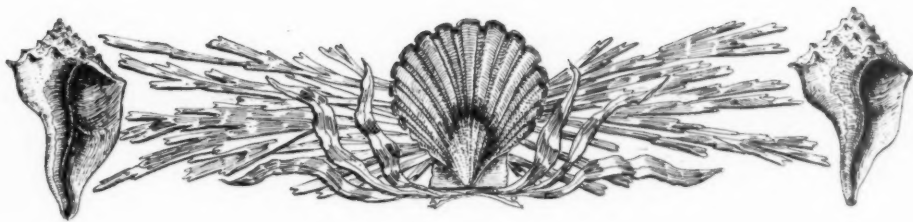
This gunbearer, Paik-sontar, accompanied Mr. R. C. Andrews on the Museum's expedition of 1912. He belongs to the "tiger hunters," an important military guild to which is elected any one who has been sufficiently courageous to kill a tiger—this feat being difficult of accomplishment with the primitive native weapons.

Azaleas, rhododendrons and other flowering shrubs are found everywhere in Korea, their colors painting the mountain slopes about the first of June



#### CHINESE JUNKS ON THE YALU

The Yalu River, in its upper parts, has a very swift current so that the junks, carrying corn, salt and other products, from the coast to the northern parts of the country, can make only one round trip and a half before the river freezes. The junks progress up the river partly by means of sails, but for the most part are towed, five or six men pulling each boat



## Ornamental Uses of Shells

By L. P. GRATACAP

SHELLS, apart from the unique product of the pearl, have often been made serviceable in garden and house and for personal ornament. The old-fashioned garden bed with its fence of clamshells is a very homely instance of the former, and the basket and box, encrusted with variegated shells, in less sophisticated days extorted an unfeigned admiration. The popular employment of the lustrous or iridescent surfaces of shells, often unsuspected beneath their dull repellent epidermis, has attained today a very wide recognition, and the industrial use, also ornamental in its purpose, of the fresh-water clam for the manufacture of buttons assumes economic importance.

A glance at the catalogues of various "pearl manufacturing companies" reveals an extraordinary aptitude for invention, and illustrates the great adaptability of shells to service. Perhaps the most striking and certainly the most æsthetic use of shells in ornament illustrated in the American Museum, is the remarkable shell turban that crowns the head of the Tahitian fire-walker in the hall of the South Sea Islands. It is composed of two wreaths of densely bedded gray-greenish, purple-tipped *Partulas*, and forms an artistic unity with the naked figure and the barbaric ceremony. The

use of shells is further illustrated in the Museum's collections by the *Helicina* and *Cassidulus* necklaces of the Samoan Islands, the shell bracelets (*Trochus*) of New Guinea, and those of the Philippine Islands, made from the apex of *Conus literatus*.

Mr. A. D. Gabay has presented a small collection of polished shells to the American Museum's section of conchology, which reveals the softened brilliancy of the sea clam (*Meleagrina margaritifera*) and the metallic splendors of the abalone. A few ornaments cut out of the mother-of-pearl and from the burnished surfaces of the abalone, serve to show the availability of this material in a kind of bastard jewelry, as well as its more legitimate employment in objects of convenience, such as paper cutters.

Among these specimens is a very curious series of pearl blisters, or delicate white films encasing minute organisms, among the latter tiny crabs whose outlines are revealed under the nacreous coating in a very unmistakable way.

Shell ornament when it assumes a personal decorative purpose is certainly very ancient. Prehistoric remains demonstrate this conclusively, as shown in buried necklaces which not infrequently, as in central France, are formed even of fossil shells. The really extraordinary affection for shell ornaments among the aboriginal races, as well as the admiration, exhibited in parlor bric-a-brac, for shell flowers among modern races, illus-

The headpiece drawing is taken from the basic design of the mural frieze in color around the shell hall of the American Museum. This design by Mr. Albert Operti, combines seaweeds with Atlantic Coast pecten and conch shells.



Ornamental basket made by the Indians of Central America. The basket itself is formed of small white oval shells (*Olicella*); the flowers are made of thin and shallow, white and rose-tinted shells (*Tellina*). Both basket and flowers are constructed with fine wire. In the American Museum

trates the appeal which these objects make to the eye. In the Board of Trade returns for the United Kingdom, in 1897 the value of the imported shells (which

included tortoise shell) was about three millions of dollars, and while an appreciable amount of this represents industrial uses — as the shell powder mixed in the finer grades of porcelain — yet a large remainder is attributable to the vagaries of taste.

The shells employed in aboriginal decoration either as insignia of office or for personal adornment, or in avocational and culinary uses, do not seem to be as numerous as the adaptability of shells in their wide range of color and form would lead one to expect. The South Sea Islanders perhaps show the most affection for them. The superb orange cowry (*Cypraca aurantia*) was worn by Fiji and Tonga chiefs as a badge of rank, the egg cowry (*Ovula orum*) by Papuans and Melanesians, and, according to Professor Lydekker, "not content with their own shells, these latter savages imported those of a species of *Struthiolaria* from New Zealand; these



Part of a shell basket made by the Indians of Lower California. The effect is showy, but the workmanship not as fine as that in the Central American baskets, glue instead of wire being the basis of construction. On exhibition in the American Museum of Natural History



they ground down until little except the mouth remained, in which condition they were strung together into necklaces."

In the Gabay collection occur a few necklaces of *Cantharidus* from the Fiji Islands, some of which have been brilliantly dyed; and shells appear in dress also as bracelets and bangles, head wreaths, fillets, coronets, belts, and nose and ear drops; while from South America come land and fresh-water shells as adornments for the cloaks of the women. Not only were the shells themselves devoted to this service, but the animal's colored operculum which closed the mouth of the shell in different kinds of *Turbo*, was also attractively utilized.

In more prosaic and more useful ways shells have aided savage culture. In

various Pacific islands fishhooks are cut from the ear shell (*Haliotis*), knives are made from the *Cyrena* and from the pearl clam, and the sinkers that weigh down the nets of the Fiji Islanders are ponderous dark cowry shells (*Cypræa mauritiana*), while the common tiger cowry (*Cypræa tigris*) cut in two, loaded with a stone, and combined with lively-colored olives (*Olivea*), attracts the cuttle-fish in the waters of these islands. Drinking cups and spoons can be readily formed from the *Cymbas* and *Melos*, and in West Africa the big *Achatina* serves the same purpose. *Concha*, the Latin word from which the science derives its name, in its secondary meaning was indeed applied to a vessel for oil, unguents, or even to a salt-cellar, as Horace sings, *Funde capacibus, unguenta de conchis*; while as trumpets, the resonant interiors of shells yield the summoning or the challenging notes "that call to dinner or to war's alarms." Several large shells, among them the great chank shell (*Turbinella pyrum*), the two large tritons (*T. tritonis* and *T. variabilis*), the helmet (*Cassis cornuta*) and the frog snail (*Ranella lampas*), all vigorously treated, meet both these requirements. In this digression from their ornamental values it is interesting to note that the thin, diaphanous, flat valve of the glass oyster (*Placuna placenta*) has been long in use in China for window panes, and that the heavy *Turbinella* — which is a sacred shell in India — has formed an oil lamp in Hindu temples.

The shell flowers — roses and tulips — which are seen in the South Kensington Museum in London, illustrate an unnatural use of the ornamental quality of shells, although the delicacies of color for a moment blind the eye to the hardness of texture and the conventionalized crudity of form. In



In the fire-walk of the Tahitian Archipelago the celebrants walk over hot stones to demonstrate the protecting power of the goddess Te-Tua-nui-o-tahu-rai. The American Museum's life-size model of a fire-walker represents him bearing a branch of the sacred *ti* and wearing a headdress of delicately tinted shells (*Partula hebe*)



A novel method of converting natural objects into elegant objects for the home consists in coating shells, sea urchins, sea horses, corals and the like, with a thin film of silver. Above are shown two large abalone shells supported by sea horses to form bon-bon dishes.<sup>1</sup> The sea horses and the outside of the shells are silvered. One shell is shown below the other in reversed position

the Gabay collection of the Museum is seen the metallic blue, polished shell of the nautilus, and in the Museum's South Sea Island hall, the heraldic use of the nautilus in conjunction with flat plates of mother-of-pearl is shown in the head-dress of the Tingua tribes of the Samoan Islands.

The problem of determining the chronological succession of æsthetic motives in races can hardly be separated from a studious consideration of the features in nature that evoke the sense of color or suggest the categories

of form. The lines in vegetation, and its concrete products in flower, leaf and trunk, stem, tendril and bud, have indisputably been assimilated in art and architecture. The column, the acanthus and lotus-leaf capitals are examples. The shapes and attitudes of animals, with expressions derived from their qualities of strength or ferocity, have most conspicuously furnished heraldic design and topical sculpture with motives and ornament. Shells, less noticeably, must have stimulated artistic feeling, although their involution in art in the way of convention is not conspicuous. Ruskin in his *Stones of Venice* enumerates

<sup>1</sup> Loaned by Mrs. F. A. Constable that they might be photographed for reproduction in the JOURNAL.

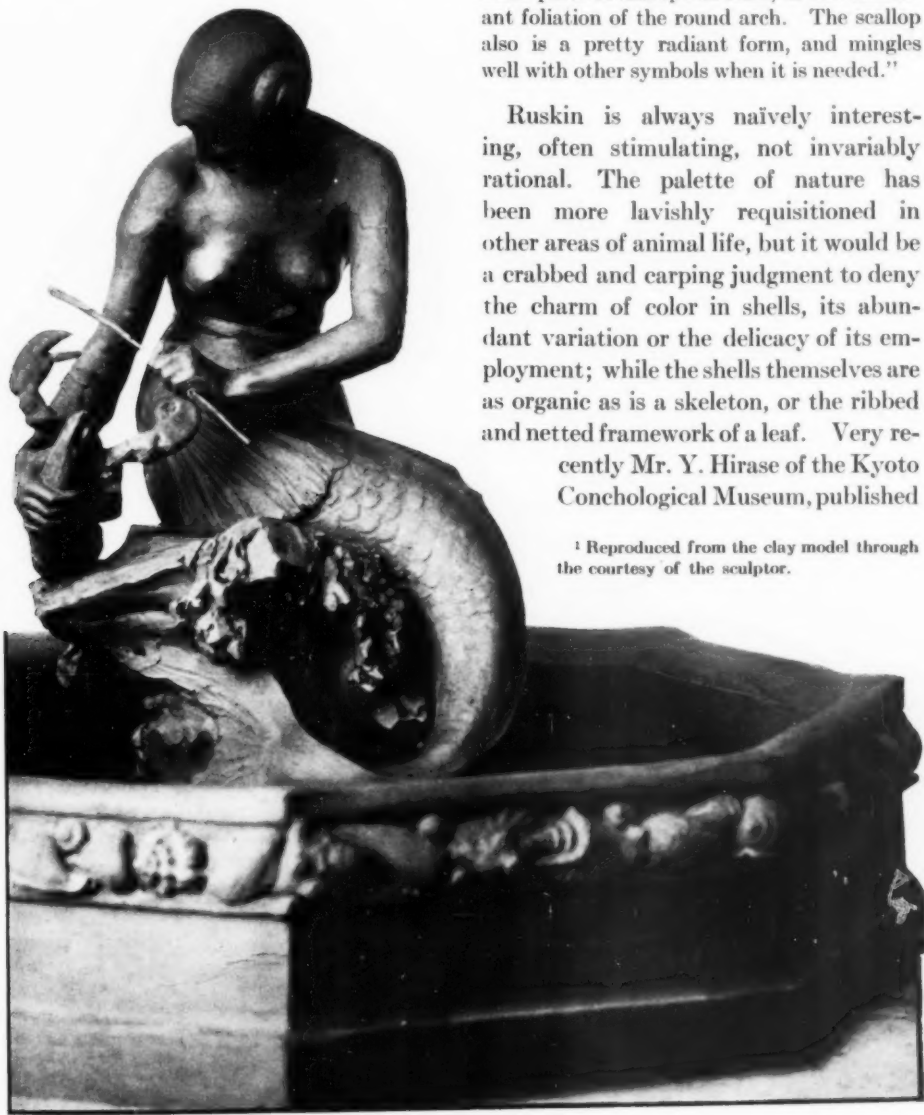
twelve "proper materials" of ornament derived from the visible universe — which with Ruskin was the most valid and the truest source of decorative ideas. The sixth of these, in a progression upward, was shells, of which he wrote:

"I place these lowest in the scale (after inorganic forms) as being moulds or coats

of organisms: not themselves organic. The sense of this, and their being mere emptiness and deserted houses, must always prevent them, however beautiful in lines, from being largely used in ornamentation. It is better to take the line and leave the shell. One form, indeed, that of the cockle, has been in all ages used as the decoration of half-domes, which were named "conchas" from their shell form: and I believe the wrinkled lip of the cockle, so used, to have been the origin, in some parts of Europe at least, of the exuberant foliation of the round arch. The scallop also is a pretty radiant form, and mingles well with other symbols when it is needed."

Ruskin is always naïvely interesting, often stimulating, not invariably rational. The palette of nature has been more lavishly requisitioned in other areas of animal life, but it would be a crabbed and carping judgment to deny the charm of color in shells, its abundant variation or the delicacy of its employment; while the shells themselves are as organic as is a skeleton, or the ribbed and netted framework of a leaf. Very recently Mr. Y. Hirase of the Kyoto Conchological Museum, published

<sup>1</sup> Reproduced from the clay model through the courtesy of the sculptor.



Fountain design<sup>1</sup> by Mr. F. B. Clark. The shell motive is introduced in the mermaid's headdress and further accentuated by the cornice of mingled shells around the basin

a very suggestive analysis, for decorative uses, of shell outlines which, half conventionalized and more or less intricately interwoven, form patterns possibly of wide adaptability to domestic and public ornament, in wall papers, curtains, embroidery and textiles.

The subject has an available circuit of application not fully realized, and a significant illustration of this may be seen in a recently completed design by Mr. F. B. Clark for a fountain, here reproduced through the kindness of the sculptor. The wall of the basin in which the graceful mermaid surmounts a seaweed-draped rock, tantalizing with a reed the mutinous crustacean, has a cornice or frieze made up of a continuous, interblended train of seashells.

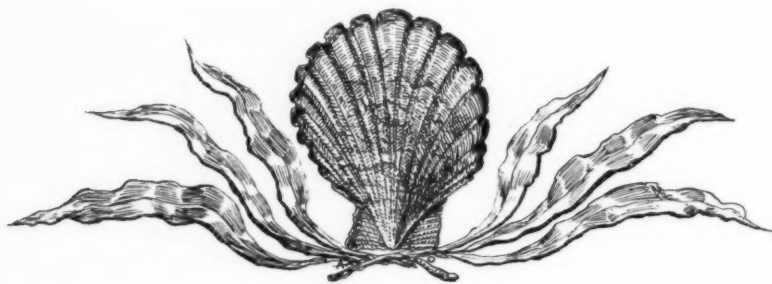
As a very curious adjunct to the aspect of shell ornamental uses was the discovery in a Franco-Merovingian burying ground at Nesles-lez-Verlincennes in France of a *Cypræa pantherina* (habitat—Red Sea to Australia), which had been used as an ornament or perhaps as an amulet; and the further statement by Dr. Tiberi, in a memoir on the shells found at Pompeii, that these same shells were apparently valued by the

Roman women of that ill-fated city, as amulets.

Perhaps the most original, and in a sense presumptuous use of shells for ornament is the recent successful attempt to coat them with a dull silver film which, being electrolytically applied, reproduces with fidelity every feature and detail of the shell's surface. Examples of such shells are on exhibition in the Museum. These silverized shells support variously designed implements, or themselves form finished vessels, handles and ornaments. The effects are ingeniously diversified by combining with the shells other objects, such as sea urchins, and by combining contrasted types of shells into an artistic composition.<sup>1</sup>

In the shell hall of the Museum Mr. Albert Operti has most effectively turned to account the outlines of seaweeds as decorative adjuncts, the pecten (*P. irradians* and *P. pallium*) as an escutcheon, and the beautiful big conch of our eastern coast (*F. carica*) as a dividing pillar. These, treated vividly in color, produce a charming mural frieze which gives the hall a needed æsthetic relief.

<sup>1</sup> This interesting ware is manufactured by Mr. L. E. Tuzo of Fanwood, New Jersey.



## Is the Crocker Land Party Living like Eskimo?

THE CROCKER LAND EXPEDITION DISAPPOINTED IN ITS HOME-COMING IN 1915, FORCED TO REMAIN IN THE ARCTIC A THIRD YEAR; ALSO TO LIVE AS DO THE ESKIMO ON THE GAME OF THE LAND UNLESS RELIEVED BY THE SHIP "CLUETT" — *THERE IS NO CROCKER LAND. LAND WHICH PEARY THOUGHT HE SAW AND NAMED DOES NOT EXIST*

THE unexpected pleasure comes to the JOURNAL of publishing the following letters by members of the Crocker Land Expedition in the American Arctic, written personally to Colonel H. D. Borup, father of George Borup who was drowned in Long Island Sound on April 28, 1912. This was just at the time when he was laying plans for the Crocker Land Expedition of which he was to have been leader. After one year's delay the expedition went north (1913), with Mr. Donald B. MacMillan as leader, and was expected to return the past fall (1915), but the ship "Cluett" chartered by the American Museum and sent to bring back the party, failed to reach Etah. Thus the men are not only disappointed in their hope of arriving home for the new year 1916, after two years of Arctic life, but also the supplies taken north in 1913 being exhausted, they face a year of living as the Eskimo do, on the animals of the land without white man's food.

The "Cluett" however did succeed in reaching North Star Bay about one hundred and twenty-five miles south of Etah, and being equipped with food and other supplies for two years, is thus ready to act for the relief of the Crocker Land party. Therefore even if the motor boat, which Rasmussen reported as starting sometime in September to bring the men from Etah to the ship, did not get through because of ice conditions, the distance is a con-

venient one for sledging between the two points. The friends of the expedition are optimistic in believing that the members of the original expedition and the party of the relief ship "Cluett" have joined forces either at Etah or at North Star Bay, and that there is good cheer in the enforced stay, while scientific work and exploration unexpectedly continue into the third year.

The following letter of November 28, 1914, is from Mr. MacMillan, leader of the expedition at Etah, to Colonel Borup:

From the newspapers you have already learned of the results of our first year's work — a failure to find Crocker Land where Peary claimed to have seen it and where indicated on the latest maps. Here it is placed due northwest of Cape Thomas Hubbard one hundred and twenty miles distant. Our observations on three successive days agreed remarkably well, putting us at 108° 22' 30" west longitude and 82° 30' north latitude, one hundred and fifty-two miles due northwest of the cape. This we covered in nine marches, being held up twice by open water for a few hours only. Between the leads, of which there were thirty-four in all, we found excellent going over a hard, compact, rolling surface enabling us to cover twenty-six, twenty-four, eighteen and twenty-four miles respectively in the last four marches. At the last camp, under perfect conditions with our most powerful glass, there was not a thing in sight throughout the whole horizon.

On the fourth march we thought we had it. All leads had frozen, the water sky had disappeared, leaving the horizon as clear as crystal. Stretching for at least one hundred and twenty degrees there was every appearance of an immense land — hills, valleys, snow-



capped peaks—as plain as a thing could possibly be. I even asked one of the Eskimo toward which point we should head. He smiled and said that he thought it was “poo-jok” (mist). Green declared that if he ever saw land that was land! The only reason I had for doubting its existence was its size. As we proceeded, it gradually changed in appearance and extent with the revolving of the sun, and finally disappeared altogether. Standing later on the heights of the cape where Peary stood eight years before, we saw the same thing, and had we not been out there we could have taken our oath that it was land. Our best judgment then, as now, is that this is a mirage of the sea ice, due to layers of air at unequal temperatures lifting the inequalities of the ice, causing the shadows and the lighted spots to resemble land. At one time this resemblance extended practically throughout the whole horizon, crossing Peary's trail of 1908, and even joining the northern shores of Grant Land. In other words, it appeared where we know positively there is no land.

I believe for several reasons that there is land farther to the west. We have removed it at least two hundred miles. If Peary saw it from Cape Thomas Hubbard then its summits rise to a height of 11,000 feet; to us, one hundred and fifty-two miles off, those same peaks would have risen in the sky to a height of 9,000 feet—too big for us to miss unless we were totally blind.

We had many serious handicaps to overcome—first, the crossing of Smith Sound. Peary stated in an interview that we were on the wrong side of the channel and were facing unusual difficulties. I realized this from the moment when our captain quit and wanted to go home. There was nothing to do but sit tight and wait for the sound to freeze and then hustle, which we did, crossing in December on the thin ice and putting in a big cache at Cape Rutherford. In February we crossed in six hours by following the edge of open water, taking a chance but it had to be done. Mumps, influenza and dysentery played havoc with men and dogs on our first start. No snow for snow houses compelled the men to sleep on their sledges at fifty-five degrees below zero for three nights which did not help matters any. Two or three of Peary's old veterans were doing too much talking so I decided to fire them at once. We returned to Etah where I at once re-

organized, cutting down the party to seven Eskimo only and three white men, having each man drive his own sledge. The plans now were carried out without a hitch. Mene Wallace, the New York Eskimo, decided that hard work did not agree with him so he left us; this was quite agreeable to me and others but when another young fellow, fearing that Mene would steal his wife, followed him I began to do some thinking. However we got up over the glacier with our heavy loads and then we were all right.

The last trip convinced me that we cannot travel far on pemmican alone for the dogs. It has too much salt in it, giving the dogs diarrhoea and causing them to vomit a yellow oil. They could not possibly pull a standard load of five hundred pounds. Our long marches in Eureka Sound were made following a killing of twelve musk oxen; the long marches on the polar sea were with practically empty sledges and on two pounds a day, which is a double ration. Had it not been for caribou at Cape Thomas Hubbard I doubt if we could have left the land. One dog dropped the first day, two on the third, one on the fifth and two on the return. Due to my constant walking and running, mine kept on their feet up to within a few miles from home, when two staggered so that I cut them loose letting them come in later.

We covered about twelve hundred miles in all in seventy-two days, leaving on March 11 and getting home on May 21, a few days before the sound broke up. Since that time we have been very busy killing walrus for our dogs this winter and laying in meat and eggs for ourselves. Within a few days I start on a thousand-mile trip to sledge the mail out to civilization, going to Upernavik, South Greenland. About March 1 we start again for Ellesmere Land, on a long fifteen-hundred-mile journey into a section of the country where no man has been for fifty years and a large part of which is unexplored—south of Ellef and Amund Ringnes lands. Shall be compelled to depend entirely upon the country for our return as I want to come back by way of Jones Sound. With such a plan sledges will necessarily be very heavy at the start and will remain so for some time as no caches can be made. As far as I know this will be the longest straight-a-way trip on record and must be made within ninety days or we shall not get back in time to re-

cross Smith Sound. If not back by the time the ship gets here in July she can come over and pick us up somewhere on that shore.

The boys are all well and happy thus far. We have plenty of coal, oil and provisions until August, 1915. *If for any reason the ship should fail to reach us we could pull through by living as the Eskimo do. . . .*

The cigars which you sent to the friends of George have nearly all been delivered. One or two of the men are expected here this moon. Ah-wah-ting-wah, one of the boys who was with George and me at Cape Morris Jesup, is dead. His box I opened for the boys here on Thanksgiving Day telling them of your gift. The Eskimo girls were highly pleased with what you and your daughter sent them. They will never forget George or you either. I have given presents to many others telling them that you wanted me to do it for George.

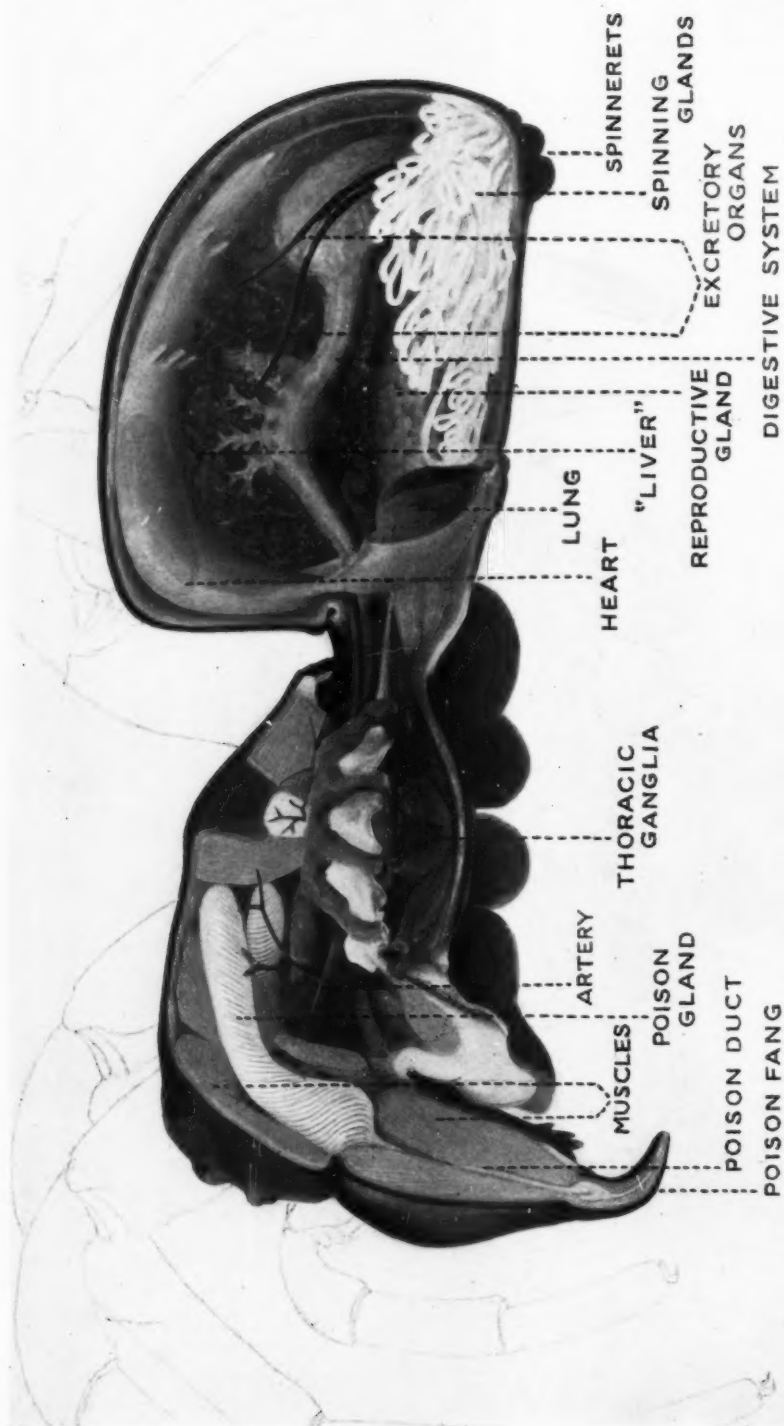
I wish you might come up next year and see this country and these people. . . . If we are not back it means some work for someone to hunt us up; our lives may depend upon that someone. . . .

The following is a letter written in August, 1914 to Colonel Borup by Mr. W. Elmer Ekblaw, geologist and botanist of the expedition, at the time engaged in research at Umanak, North Star Bay:

Just a message of greeting and good wishes from this "Land of Thule" as the Danes call the unglaciated tract about Wolstenholme Sound, where I am engaged in geological and biological research this summer; just a message of greeting from the busy season in this far-away corner of the world. Our fine summer is fast waning. In two weeks our all-day sun, with us since April 21, begins dwindling and on October 21 it will leave us to twilight and darkness for four months. The harbor is almost clear of ice except for the icebergs that stud the waters of the sound, drifting idly about in the tidal currents or aground on some shoal. Daily we are expecting a ship, either one from the United States or from Denmark.

The past year has been one of adventure, experience and satisfactory scientific work. Our leader has written you in full regarding the work of the expedition so I shall not tire you with a repetition of the narrative which he has already sent you. I shall add only that my summer's work at this station gives me opportunities for correlations and comparisons with similar work at Etah next year which I had not expected to have.

I trust that I shall see you upon our return, which I think will be sometime in the autumn of 1915, unless ill luck betide the vessel coming up after us. Perhaps we may have the pleasure of finding you aboard her when she reaches Etah and safe anchorage in Foulke Fjord.



MODEL SHOWING INTERNAL ANATOMY OF A COMMON FIELD SPIDER

Many delicate dissections of this insect were made by Mr. Matusch in order to be able to model its organs and represent their relative positions and connections with absolute accuracy. A clay model was first made, from which a hollow wax cast was taken. Then the internal organs, modeled in wax or glass from actual dissections, were arranged in the hollow body

# The Work of Ignaz Matusch and Its Significance to the Museum

By ROY W. MINER

THERE are born occasionally persons endowed with an unusual combination of qualities which so permeate and take possession of the mind as almost to replace the will, driving their possessor irresistibly onward through unusual paths in life. So absorbing becomes the life passion that extraneous matters, important to others, become subordinated to the grade of merely disturbing influences. These natures are delicately balanced, sensitive, keenly alive to impressions, reacting to the lights and shades of visual impression with the accuracy of selenium, but with an intensity that affects the whole psychology of the mind.

Such a person was the artist modeler Ignaz Matusch. In him this native endowment was supplemented by a training from boyhood in the most delicate handling of the materials of his art, and as one watched him at work manipulating wax, wood, celluloid, tiny needles of hand-wrought german silver or minute splinters of glass, welding, melting, joining all into place in the intricate construction of his giant insect models, one felt that the most refractory materials were malleable to his hand. This of course was an illusion. The mind guiding the hand was trained to select, almost instinctively, the substances best adapted to the work. The great, rounded, clumsy-looking finger tips worked with the delicate sensitiveness and almost feminine touch popularly associated with the long tapering fingers of the so-called "artistic hand," and the very dexterity of their manipulation more than convinced the

observer that the true hand of the artist is not that physical member but the accurate eye, the superperceptive brain and that correlation through nerves and muscles which is produced only by long-continued and arduous training backed with an infinite patience and enthusiasm.

This may seem high praise to some, but not to one who has watched Ignaz Matusch at work day after day, year after year, gradually building up his wonderful insect models, such as the giant housefly shown in the hall of public health, and patiently engaged on the minute details of the complex exhibits in the Darwin hall, in which his work is blended with that of other skilled preparators, as in the case of the window groups. Among the models which are peculiarly his work may be mentioned the series illustrating the life history of the tree hopper, accurately constructed after long-continued and painstaking original observations, and a series illustrating the peculiar unadaptive structures seen in many tropical species of this same group. A model showing the anatomy of the common spider is one of the best products of his skill, in the preliminary work for which he made many original dissections with the collaboration of Prof. Alexander Petrunkevitch. His share in the marine window groups however, is of peculiar significance and has contributed much to their success and the widespread attention which they have attracted. Among them the Cold Spring Harbor group was largely constructed by Mr. Matusch, and his work is joined with that of other mem-



#### GROUP SHOWING FAUNA OF A SAND SPIT

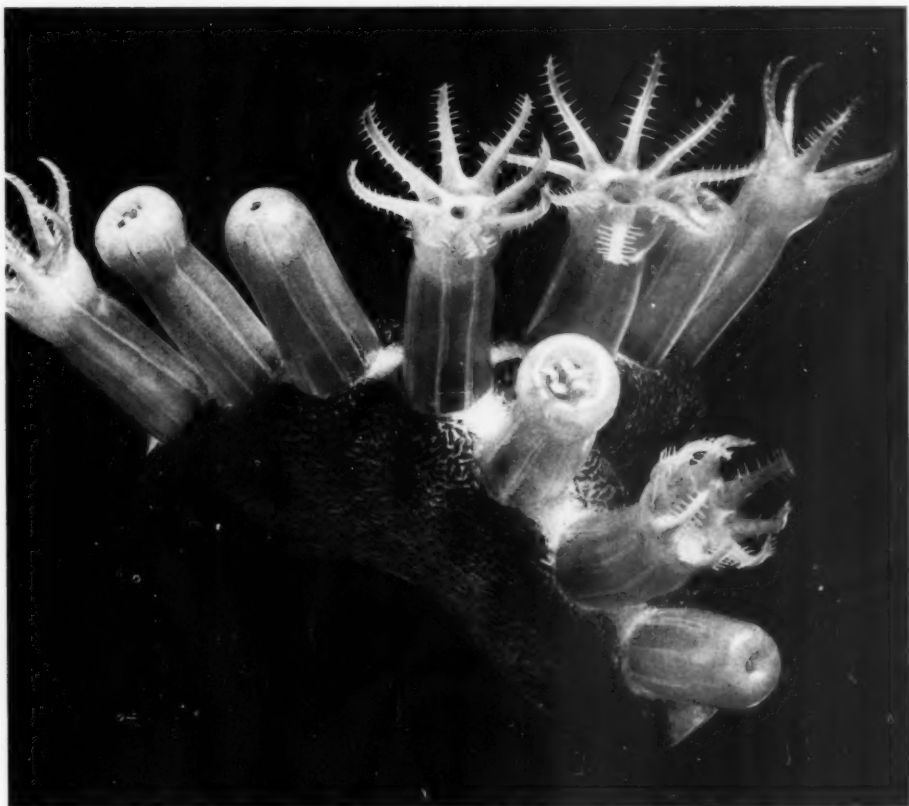
This complicated group, full of intricate minutiae, shows ribbed mussels (*Modiola plicatula*) closely packed among the roots of spartina grass, and overruled by fiddler crabs two of whose burrows are shown in section. Below the surface of the water a starfish and a drill snail are shown attacking an oyster; other animals represented are mud crab, long clam, edible mussel, mud snail and serpulid worm. The group was assembled by Mr. Matausch and the fine modeling of wax for accurate representation of texture is essentially his work



bers of the preparation staff in the Woods Hole annulate group and the Vineyard Haven wharf-pile group.

At the time of his death, Mr. Matausch was putting the greater part of his time and attention on his important share in the complex and ambitious Nahant tide-pool group, which is as yet incomplete. The modeling and coloring of the natural bridge of rock which is to arch the tide pool was entirely his work and for months he had labored industriously assembling the thousands of separate casts which go to make up the great zone of barnacles, one of the

conspicuous features of the group. This part of the work he left complete. Other artists, meanwhile, were modeling and coloring rockweed, preparing seaweed and sea animals for the underwater portion of the group, and Mr. Matausch was engaged alternately in assembling these and in constructing the important starfish colony for the group, when he was taken with the illness which resulted in his death. His unfinished work must be completed by others, but what he has done for the Museum will remain in its halls as a fitting memorial to his great ability.



One of the many interesting models in the Darwin hall made by Mr. Matausch in collaboration with Mr. Mueller, glass blower, and Mr. Shimitori, colorist. This model, 8,000 times actual size, represents the tip of a "sea whip" with some of the tiny polyps which build it up as the coral polyps build up coral

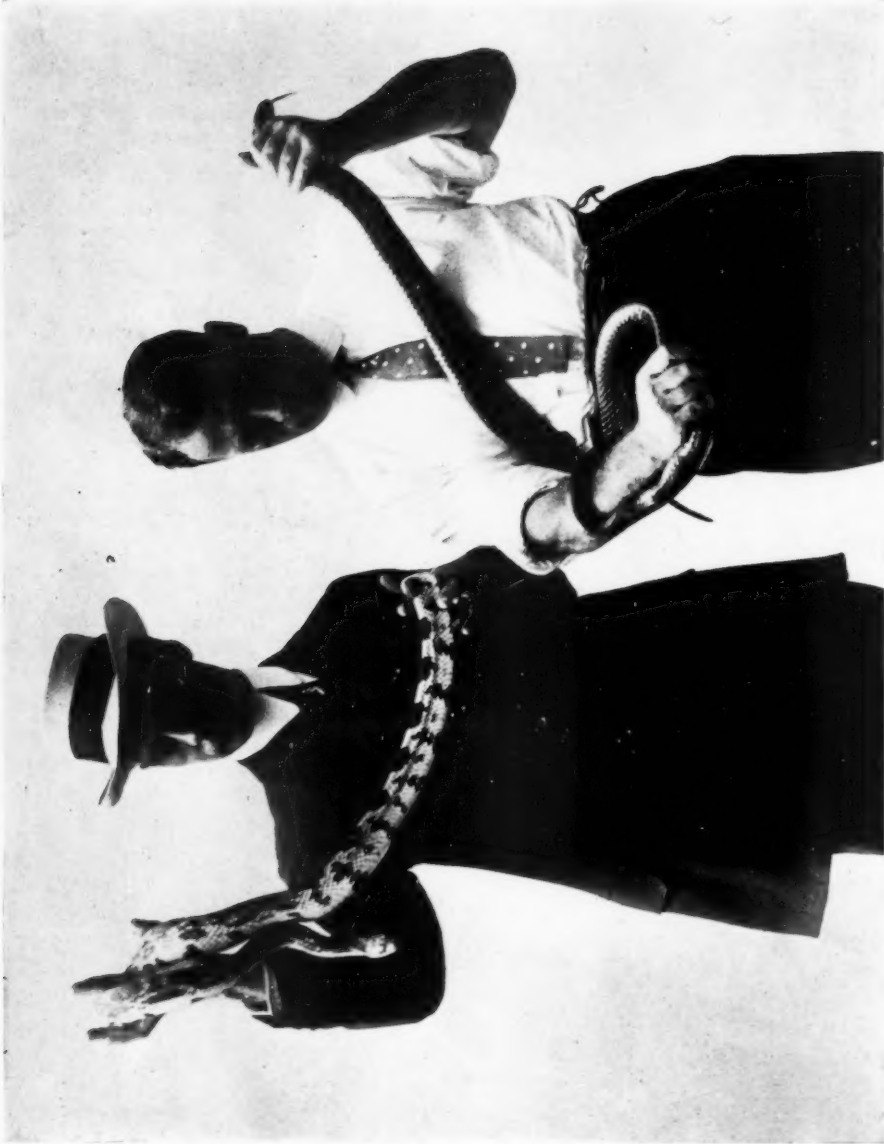


Photo by Mr. Elwin R. Sanborn

#### EXAMPLES OF PINE AND INDIGO SNAKES

Many snakes become tame in captivity and can be handled freely. The black-and-white pine snake (*Pituophis melanoleucus*, in the hands of Mr. Raymond L. Ditmars, curator of reptiles at the park of the New York Zoological Society) is often very bad-tempered, resenting any familiarity even after months of captivity. It is a powerful constrictor, feeding mainly upon rodents. The indigo or gopher snake (*Spilotes corais couperi*, held by Mr. A. L. Gilliam) is one of the most docile snakes known. These snakes attain a length of eight feet and with the exception of the pilot black snake are the largest species of harmless snakes in the United States.



Hunting "bell-tails" (diamond-back rattlers) among the saw palmettos, St. Johns River, Florida

## A few Observations on Snakes in the Field

By ARTHUR L. GILLAM

With illustrations from photographs of the living snakes in the field by Mr. E. L. Bell and Mr. A. L. Gillam

SUPERSTITION, exaggeration and lack of knowledge usually run riot in the telling of snake stories. One day this past summer while I was in the reptile house at the New York Zoological Park, a man called two of his acquaintances over to the small cage where a horned rattlesnake (*Crotalus cerastes*) was confined and said to them: "See that snake there? Well, it's the most dangerous snake in the world. If it sticks that horn into you, it means instantaneous death!" I hastened of course to correct his statement, and explained that the "horn" was harmless and that the snake's venom was ejected through enlarged teeth called "fangs." The gentleman was not particularly grateful however for my interference. At another time, when one of my friends and I were snake-hunting in Connecticut, we stopped for a few moments at a

farmhouse along the road to inquire of the farmer living there as to the whereabouts of a den of the "chunkhead" — that being the local name of the copperhead snake (*Ancistrodon contortrix*). After having directed us, he told us with seriousness of various harrowing experiences he claimed to have had with "chunkheads" and how they had "jumped" at him a distance of fifty feet right through the air. He was unacquainted with the fact that it is practically a physical impossibility for any snake to "jump" or strike much farther than a distance equaling about two-thirds of its own length.

Although it was somewhat accidental that I first took an active interest in snake-hunting, I soon found it such a fascinating outdoor sport that I became absorbed in it. It combines excitement and healthful, red-blooded exercise with an ever-changing



Snake-hunting in northern New Jersey and in the Ramapo Mountains, New York

association with nature. Catching the snakes is only a part of the sport; it opens a new field for the camera. Snakes are not always submissive posers. I have often worked for more than an hour to get one quiet long enough for the portrait. Sometimes a naturally quick, nervous snake would surprise me by immediately assuming a satisfactory pose and holding it the necessary length of time for a clear exposure, while a less agile and less sensitive one might make the matter very difficult by moving at the wrong time.

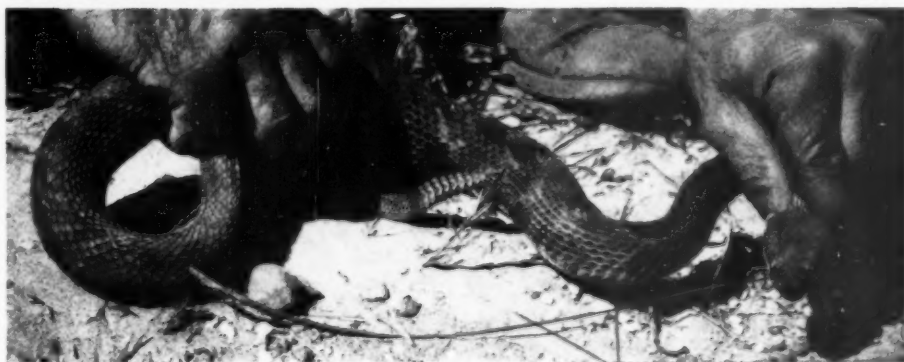
Snakes have individual as well as class peculiarities. For instance, although it is the common belief that a rattler will always sound its rattle as warning of its presence, my experience has been that this cannot be relied upon. In fact it is apparently an exception to the rule to find one thus giving a warning. Of the numerous specimens which I have captured during the past two or three seasons,

only a very few have rattled before being actually interfered with. These were extremely nervous examples and remained such throughout the period of a month or more that they were in my possession. During that time the slightest movement made by any one within sight or sound of their cages would be the signal for them to start an aggressive buzzing. That this nervousness or anger was peculiar to these particular specimens and not to the season, there can be little doubt. On one occasion, within a few minutes of capturing one of these nervous specimens, I caught another rattler of practically the same coloration and size and with the same number of rattles, which when it attempted to escape I headed off, forked and then bagged by hand without its having rattled at all—although it had repeatedly struck at my stick. Frequently I have known rattlesnakes to strike at my stick or at me without having sounded the rattle.

Some of the rattlers observed have been so gentle and quiet in their behavior that had I been willing to chance it, I believe I could safely have handled them, although I gave them free liberty of their heads. It is never wise however to let confidence lead into any recklessness. Other specimens on the other hand, continually acted in an altogether vicious manner and showed no signs of taming.

Judging from a single specimen one can never be sure just what to expect from another snake of the same species. One young rattler (about a year old) which I caught in Connecticut was about the sauciest snake that I ever met, while another of the same age captured in Massachusetts by Mr. Charles Snyder (of the New York Zoological Park) and myself a few days earlier was its exact antithesis. A

party of seven of us had been out to "look over" a special den on top of one of the mountains, but had had no success in finding specimens as it was late in the season at that spot and evidently all of the snakes had crawled away to lower levels for food and water. On our homeward way we had wandered down nearly to the foot of the mountain and were in fairly heavy timber on an easy slope of land, when the youngest member of our party tripped and fell full length on the ground, throwing his hands out ahead of him to break the force of his tumble. Immediately there was a scream from him of "Rattlesnake!" and with almost as much speed as he had made in falling he scrambled to his feet again. When his left hand had hit the earth, he had seen that it was within about four inches of a small rattler



Forking a rattler preliminary to bagging it. After the rattler is thus secured so that it cannot strike (forked stick about five feet long), the fork can be replaced by the fingers and the snake safely handled in the transfer from the ground to the collecting bag. The tail should be grasped with the other hand to prevent the snake coiling about the arm



which was lying in a coil and wide awake. The snake made no attempt however, either to strike or escape, but waited patiently to be bagged. Had the same accident happened with the little Connecticut rattler I am certain that there would have been at least a couple of punctures in the young man's hand.

In my opinion, a rattlesnake uses its

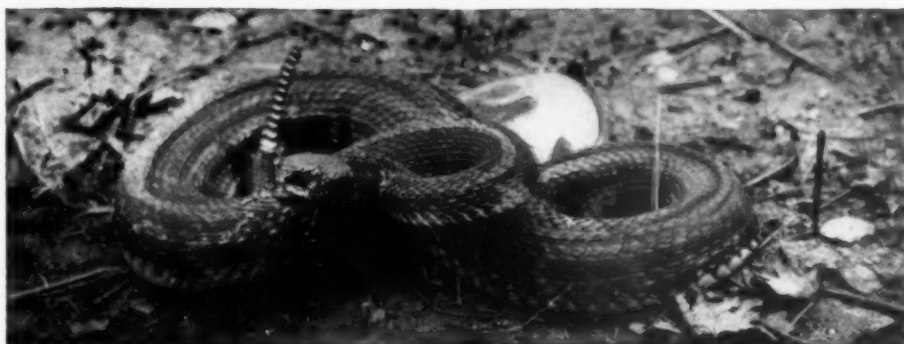


Mr. Charles Snyder, head keeper at the park of the New York Zoological Society, showing how he handles a poisonous snake for observation of its mouth and fangs. The specimen is one of fifteen banded timber rattlers captured on a trip to Scaghticoke Mountain, Connecticut. The teeth of harmless snakes are solid; poisonous snakes have two or more grooved or hollow fangs in the upper jaw, connected by a duct with a poison gland on the side of the head

rattles not only as an expression of nervousness and anger, but also as a lure to attract the curiosity and attention of its prey and bring this prey within reach of the strike — or perhaps so to bewilder the prey with fear that it will be incapable of moving until the strike can be made. Also it seems that the rattling is a mode of communication that snakes have with one another. I have been on snake ledges at various times when everything was still and quiet, and while in the act of bagging the one or two snakes which were then in sight, have heard one, two or three others answer the buzzing my captives were making — the replies coming from widely separated points. In one instance a reply came from another ledge about eighty yards from me. I have sometimes wrapped the rattles of newly captured specimens in damp cotton before I placed them in my bags so that their buzzing would not confuse me in locating a stranger's song.

One fallacy which most people believe, is that a rattlesnake or copperhead can always be located by the odor. The fact is, one may handle fifty or more of either species — holding them within a foot of the nose — and not observe any particular odor. Then at some other time, one or more of the lot may chance to emit its pungent secretion. If it does, the "perfume" is really very noticeable — something of a cross between banana oil and cucumber, yet like neither. Under proper atmospheric conditions the odor might be noticed sixty yards away, although five or ten yards would be the more likely distance. Sometimes I have noticed the scent where I was unable to find any snake, in spite of careful searching. Considering the nearest retreat where a snake could have escaped my observation, I have figured that the odor must have been there ten minutes or longer before my arrival.

Usually a rattlesnake or copperhead, if disturbed, will attempt to escape, but often it will remain just where it may happen to be, silently or otherwise, and refuse to budge. Frequently I have almost stepped on one, or have stepped over one before seeing it. It is far safer to let a snake crawl over your feet than to put your foot on it. When it is crawling it is thinking more of getting somewhere than of striking and if a person remains quiet, there is scant likelihood of its becoming troublesome, although it does not have to coil to strike. Mr. Bell and I



Three specimens of poisonous snakes — Copperhead known locally as "chunkhead" (*Ancistrodon contortrix*); moccasin or "cotton-mouth" (*Ancistrodon piscivorus*) from Cape Canaveral, Florida; and banded timber rattler (*Crotalus horridus*) from the Wallkill-Hamburg Mountains, New Jersey.

Of the one hundred and fifty snakes of the world whose bite could bring death to man, only seventeen are native to the United States, with seldom more than two in any given district. The only successful treatment for snake poison after it has entered the circulation, is injection of antivenomous serum. Such serum is of untold value in Brazil, South Africa and India. Snake-hunters can render themselves immune to snake bite for a few days or weeks by precautionary injections of such serum. Dr. S. Weir Mitchell was a pioneer in the United States in the study of snake venom. Experiment is still in progress toward the production of a perfect serum. This must be obtained from an animal (horse) made immune by large dosages of the mixed venom of a large number of poisonous snakes, since immunity to the bite of one species does not always insure immunity to that of others.

have taken photographs of each other as we stood in the midst of four or five large rattlers — some crawling over or between our feet. Yet the "stunt" was not as dangerous as it might seem. It was only necessary for one

of us to stand still while the other drove the snakes toward him. The one standing was merely part of the scenery according to the snakes' view, and everything was serene as long as we did not move while within their

striking distance. When a rattler or copperhead does strike however, it sometimes not only makes a simple strike with its fangs but also grips its jaws together and tries to wrestle its fangs deeper into the object struck so as to cause a better injection of its venom.

On one of my trips to the Wallkill-Hamburg Mountains of New Jersey while I was standing at the edge of the top of a small cliff about forty feet high, I discovered two rattlers, male and female, lying near each other at the bottom. By retracing my steps about eighty yards, I was able to work a way to

the foot of the cliff, then after fixing up the snake bag in nearby bushes, I advanced to where the rattlers were, meanwhile lightly beating the low berry bushes ahead of me with my stick so that I might not accidentally step on any hidden snakes. When I came up to the two snakes the yellow-phased one (female) slowly crawled away directly to the rear of the black one (male, supposedly), which went into a coil, head toward me and waited. Neither snake rattled although I was then standing within four or five feet of them, and had beaten the bushes close to



Pilot or mountain black snake (*Coluber obsoletus*) and the more abundant common black snake or racer (*Basiliscus constrictor*). The pilot can be distinguished from the racer by its broad head, keeled scales and white spots on the margin of the scales as well as by its slow movement, its good nature and its great power as a constrictor. The pilot is, next to the indigo and pine snakes, the largest harmless snake in the United States

them with my stick. At the time, it seemed to me as though the male was deliberately protecting the retreat of the female.

Snakes seem to be beyond hard and fast rules of individual action and the more they are studied the more unexpectedly interesting are the traits discovered. They offer an endless subject for fascinating investigation.

The hog-nosed snake (*Heterodon platyrhinus*) otherwise known as "puff adder" and "spreading adder," is a big bluffer and the "possum" among North American snakes. It is absolutely harmless in spite of its warlike posturings and hissings and can under no conditions be induced to bite. When its threats prove vain, it simulates death. Even the young snakes newly hatched from the eggs hiss, spread and flatten the head and neck and strike savagely, later playing dead. The ringhals cobra of South Africa also is reported to feign death [F. W. Fitzsimmons, *Snakes of South Africa*]



## Museum Notes

SINCE the last issue of the JOURNAL the following persons have become members of the Museum:

*Life Members*, MRS. FREDERIC DELANO HITCH, MRS. STEPHEN V. HARKNESS, and MESSRS. WILLIAM FRANKLIN LUXTON EDWARDS, ALFRED WARREN GALE, NORMAN JAMES and FREDERIC A. JUILLIARD;

*Sustaining Members*, MISS EMELINE ROACH and MESSRS. A. W. ERICKSON, J. PRENTICE KELLOGG, and PHILIP C. LINDGREN;

*Annual Members*, MRS. P. B. ACKER, MRS. ROBERT C. BIRKHAHN, MRS. ARTHUR C. BLAGDEN, MRS. CHARLES H. BROOKS, MRS. JOEL FEDER, MRS. HENRY E. HAWLEY, MRS. E. R. HEWITT, MRS. ROBERT HUNTER, MRS. R. G. HUTCHINS, JR., MRS. WILLIAM B. ISHAM, MRS. S. M. JARVIS, MRS. PHILIP B. JENNINGS, MRS. HELEN M. KENNERLEY, MRS. PERCY H. STEWART, MRS. A. W. SWANN, MRS. CARLL TUCKER, MISSES MARIAN HAGUE and MARGARET C. HURLBUT, DR. MYRON P. DENTON, DR. L. EMMETT HOLT, DR. OSCAR H. ROGERS and MESSRS. T. HOWARD BARNES, WELCOME W. BRADEN, WILLIAM B. DOWD, SANDFORD D. FOOT,

GEORGE S. FRANKLIN, HENRY HERING, BERNHARD HOFFMANN, ARTHUR S. HYDE, JOSEPH A. MCALEENAN, F. H. THEAKSTON, SAMUEL HINDS THOMAS, LEWIS M. THOMPSON and WILLIAM TURNBULL.

ALL doubt as to the probable safety of the members of the Crocker Land Expedition, and of the party sent under Dr. Hovey to bring them home, was removed on February 6 by a letter from Mr. Knud Rasmussen, the Danish explorer, dated London, January 28.

Mr. Rasmussen was in London in order to meet his ship "Kap York" which had recently arrived in an English port from Greenland. Captain Pedersen of the "Kap York" was in connection with the "Cluett" and Dr. Hovey on September 12 for about two hours and therefore had the latest news of the relief party.

The ports were then full of new ice and Dr. Hovey dared not put into port from fear of becoming icebound for the winter. The "Cluett" was therefore waiting in Wolstenholme Sound for the return of Mr. Rasmussen's motor boat, which had been



ispatched to Etah to bring back the Crocker Land party.

Captain Pedersen was of opinion that if the motor boat did not return soon, it would be impossible for the "Cluett" to get home in the fall of 1915. In this case however, there need be no fear for Dr. Hovey and the other members of the expedition, who would receive assistance from Mr. Freuchen, (the manager of Mr. Rasmussen's station at North Star Bay) or could get provisions by sledge from Upernavik, where the Danes would be glad to make welcome the members of both expeditions.

MR. M. P. SKINNER has presented to the American Museum valuable motion-picture films and photographs of animals of the Yellowstone Park, obtained during his twenty years' experience in that region. Mr. Skinner is a member of the American Museum and has been working in the Museum building during the winter on a book on the birds of the Yellowstone Park. He is an authority on the animal life of the Yellowstone and has rendered much service to the United States Biological Survey in connection with a census of the park.

THE animals of the Yellowstone, described in the present issue of the JOURNAL, are well represented in the North American mammal hall of the Museum by a series of unusually large and well executed group studies, showing the animals as they appear in their natural environment. Specimens of the American bison, in all stages of development, and in summer and winter coats, are shown pawing the Kansas prairie where they formerly ranged in countless herds. Several moose, with adults and young of both sexes, are shown in a second-growth forest — their favorite feeding ground. There are three fine specimens of the elk, or wapiti, formerly so abundant in the mountains and foothills of the northern and western states and now comparatively rare; also groups of mule deer, Virginia deer, mountain sheep and pronghorn antelope. The rapidity and completeness with which the advance of civilization has wiped out of existence the vast herds of these wild creatures that once owned the hills and plains of this continent, makes the sanctuary the Yellowstone affords to the surviving remnants an incalculable advantage to the cause of natural history — as well as

adding to the value of the groups in the American Museum.

THE annual meeting of the Board of Trustees of the American Museum of Natural History was held at the residence of Mr. Ogden Mills, on February 7, 1916. Mr. Henry P. Davison was elected a trustee in the class of 1917 to fill the vacancy caused by the death of Dr. Daniel Giraud Elliot. Messrs. Arthur Curtiss James, Walter B. James, J. P. Morgan, Percy R. Pyne and John B. Trevor, trustees in the class of 1916, were reelected in the class of 1920. The trustees were the guests at dinner of Mr. Ogden Mills.

OWING to ill health Mr. Charles Lanier has resigned his position as treasurer of the American Museum of Natural History. At the recent meeting of the Board of Trustees of the Museum, a resolution was passed accepting his resignation with regret and expressing appreciation for the service he has rendered the institution in serving as treasurer for the past twenty-five years. Mr. Henry P. Davison was elected treasurer for the year 1916.

IN view of their generous contributions and genuine interest in the growth of the Museum the trustees have passed a special resolution electing Messrs. Cleveland H. Dodge, Arthur Curtiss James and Archer M. Huntington, Benefactors of the Museum; Mrs. John B. Trevor and Mr. Felix M. Warburg, Associate Founders; Dr. Bashford Dean and Messrs. James B. Ford and Henry C. Swords, Patrons; Mrs. Herbert L. Satterlee, a Fellow, and Mrs. M. Orme Wilson and Messrs. Lincoln Ellsworth and Alexander Smith Cochran, Life Members of the Museum.

OWING to the fact that a number of higher classes of membership in the American Museum have recently been created by the trustees and that many former contributors now dead would have been elected to these higher memberships had such degrees been in existence during their lives, it was resolved at the recent annual meeting of the Board of Trustees to place the names of such contributors in the respective classes of membership to which their contributions would have made them eligible. In accordance with this resolution the names of Mrs. Robert L.



Stuart and Messrs. Morris K. Jesup, Darius Ogden Mills and William H. Vanderbilt were added to the class of Benefactors; those of Messrs. James M. Constable, Henry O. Havemeyer, Oswald Ottendorfer, Percy R. Pyne, 1st., Charles E. Tilford and Cornelius Vanderbilt, 1st., to the class of Associate Founders; those of Mrs. Martha T. Fiske and Messrs. Hugh Auchincloss, Benjamin P. Davis, William E. Dodge, 2nd., Henry Iden and William R. Sands to the class of Associate Benefactors; those of Miss S. M. Hitchcock, Mary E. Rogers, Frederika Gade, and Messrs. Samuel D. Babcock, Joel Goldenberg, Solomon Loeb and Edward S. Russ to the class of Patrons, and that of Leonidas A. Van Praag to the class of Fellows.

THE MUSEUM is now publishing Professor Bashford Dean's bibliography of fishes. This is a compilation which aims to be of constant use to all who seek to learn what is known of a large and important series of the backboneed animals. It is the more necessary since the literature of this subject has become so vast and is so widely scattered that even specialists remain in ignorance of important papers which concern their work. To give an idea of the scope of the present bibliography we need only mention that it refers to about 50,000 books and scattered papers in all languages, and deals with the entire subject of fishes, fossil as well as living, — their distribution, structure, physiology, development, their parasites and diseases and their evolution. In this sense, it is believed to be the most complete bibliography which has hitherto been attempted of any major group of animals.

The present work has been in preparation off and on for twenty-five years, and represents a large amount of detailed research. From 1910 to 1913, Dr. Louis H. Hussakof cooperated in the work; since that time it has been enlarged and edited by Dr. C. R. Eastman and during the past few years numerous authors have given their time generously in revising their special bibliographies. It should also be recorded that the National Museum generously contributed a manuscript on the bibliography of fishes — mainly dealing with the kinds of fishes and fisheries — which the death of Professor G. Brown Goode left unfinished.

The volume now in press gives the names of authors who have written upon fishes,

listing their works in chronological order. It includes all references dating from the middle of the eighteenth century down to the year 1914. Earlier literature of the fishes will be published as an appendix to Volume I. Volume II, which will probably be in press in 1917, will provide an elaborate index for Volume I, digesting all titles, and telling the reader what books or papers he should consult for any particular subject.

THE J. Leon Williams collection, and other exhibits illustrating fossil man and his ancestry, were exhibited during 1915 at the Panama-Pacific International Exposition. They have now been returned to the Museum and are installed in the hall of the age of man. This collection should be studied in connection with *Men of the Old Stone Age*, the recent book, by Professor Henry Fairfield Osborn.

FOUR cock pheasants, illustrating partial albinism to a complete degree of albinism, have been presented to the American Museum by Mr. Walter Winans of Surrenden Park, England. These, with two normal pheasants also presented by Mr. Winans, are being mounted for a group showing gradations from the normal to the albino bird.

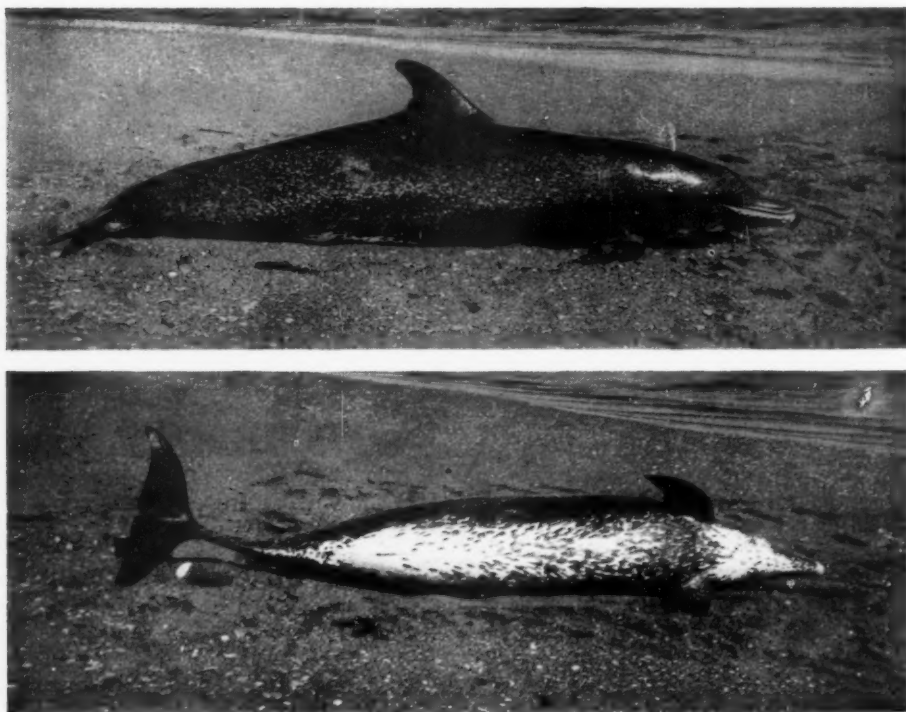
A RECENT addition to the exhibits in the North American mammal hall of the Museum is a group illustrating the seasonal change in color of the varying hare (*Lepus americanus virginianus*). Like the ermine and some other northern mammals, this animal changes its coat, being brown in summer and pure white in winter — a good example of protective adaptation. For many years it was supposed that the actual hair of this animal changed color, but it has been conclusively demonstrated by Dr. J. A. Allen, curator of mammalogy at the American Museum, by examination of many series of specimens in all stages of the change, that there occurs an actual shedding of the darker hairs and a new growth of white ones. This process is gradual, usually occupying several weeks. The specimens in the group show a few of the stages passed through by the hare in changing from the brown of summer to the white of winter. The group has been arranged by Mr. A. E. Butler in the Museum's taxidermy studio.

MR. RUSSELL J. COLES, whose contributions to the Museum's department of fishes are well known, secured a fine specimen of the spotted porpoise, *Prodelphinus plagiodon* (Cope), during the past summer off the coast of North Carolina. At the time of the capture a rough sea made getting possession of the specimen after it had been harpooned a task of difficulty and danger, and a less persistent man than Mr. Coles would undoubtedly have cut the animal loose. After his efforts were rewarded by getting the animal ashore, he made a plaster mold and took a complete series of photographs and measurements; the flesh was then cut away from the skeleton which was sent to the Museum. The spotted porpoise is relatively rare along the coast of our Southern States, and the Museum has not previously possessed even one skeleton representing its genus.

COMMISSIONER GEORGE D. PRATT, of the New York Conservation Commission, has secured the services of Mr. Francis Harper

of New York City to make a detailed study of the fishing waters of Oneida County, New York, as a basis for scientific working plans for fish stocking and protection. The appointment is in furtherance of Commissioner Pratt's plan for seeing that the product of the State fish hatcheries is followed to its ultimate destination, and that the proper planting and protection of the millions of fish annually produced in the State hatcheries are assured. When completed in Oneida County the work will be extended to other parts of the State. Mr. Harper was formerly engaged in private research work in the department of ichthyology of the American Museum.

THE JOURNAL has been in receipt for some time past of a small but steady stream of new subscriptions from persons who have come upon it quite fortuitously and to whom it was hitherto unknown. In view of this and of the fact that practically every subscriber renews his subscription annually, an effort is being made to bring the JOURNAL to the



Two views of the spotted porpoise (*Prodelphinus plagiodon*), which was taken during the summer of 1915 by Mr. Russell J. Coles and presented to the American Museum, together with many photographs and a plaster mold made from the fresh specimen immediately after capture

attention of some of the many thousands unconnected with the Museum who are nevertheless interested in natural science.

The cost of publishing the JOURNAL is considerable, and the same expenditure might easily benefit a much larger circle of readers. The collaboration of present friends is asked in making it known.

A SERIES of color pictures, taken by Messrs. Henry Berger, Jr., and Frank Ives Jones, showing the Columbia Highway, Rainier Park, and mountain scenery of the Northwest, will be shown in the auditorium of the American Museum on Thursday evening, February 24, at 8.15 o'clock. The pictures have been taken by the new Paget process of direct color photography.

MR. ALANSON SKINNER has resigned his position as assistant curator in the department of anthropology of the American Museum, to accept a position where he will continue in similar work. Mr. Skinner has been connected with the Museum since 1902, when as a boy, he accompanied local field parties engaged in archaeological work.

THE Zuñi Indian collection, made for the American Museum last summer by Professor A. L. Kroeber, is now on exhibition in the hall of the Indians of the Southwest.

THE recent death of the Siberian tiger in the zoölogical collection at Bronx Park has provided the Museum with a splendid skin for mounting. This will be used in constructing a group for the Asiatic hall when the hoped-for new wing of the Museum shall have become an actuality.

CONSIDERABLE improvements are being made in the exhibits on the south side of the dinosaur hall of the Museum. The preparation of new exhibits has for some time interfered with the opening of this part of the hall, which contains the various kinds of fossil reptiles other than dinosaurs. The fine series of ancient Permian reptiles from Texas and South Africa has now been rearranged with important additions and the fossil turtles are being partly rearranged so as to provide more space for new exhibits.

For several years past Miss Dorothea Bate has been engaged in systematic and very

successful explorations for fossil vertebrates in the caves of the Mediterranean Islands. One of her recent discoveries is an interesting extinct type of antelope found in caves of the Balearic Islands a few years ago and named *Myotragus*. It is a relative of the chamois but is distinguished by enlarged lower front teeth like the incisors of rodents and had very short legs and feet. Miss Bate has sent to the Museum a series of specimens of this animal — incomplete skulls, jaws, limb and foot bones, which are on exhibition in a table case in the hall of the age of mammals.

Explorations for fossil vertebrates in caves and other localities in the West Indian islands are yielding results no less remarkable than those obtained by Miss Bate from the islands of the Mediterranean and of especial interest to Americans. The explorations of Professor de la Torre and Mr. Barnum Brown in Cuba have already been noticed in the JOURNAL. More recently the zoölogical survey of Porto Rico, conducted by the New York Academy of Sciences, has secured remains of several new and remarkable extinct animals from that island. It seems certain that systematic and thorough explorations in all the Antilles would yield results of great scientific value, which would go far toward settling the much disputed questions as to their geologic history and connections with one another and with the mainland.

TWENTY-FIVE ancient pottery vessels exhibiting unusually fantastic and effective decorative designs and obtained in the Mimbres Valley, New Mexico, have recently been purchased by the Museum from Mr. E. D. Osborn. Also a varied collection of specimens obtained in the neighborhood of Oldtown, Maine, and representing the culture of the Penobscot, Passamaquoddy, Malecite and Micmac Indians, has been purchased from Mr. G. A. Paul.

THERE will shortly be installed in the hall of public health of the American Museum an exhibit illustrating the comparative food values of a number of common articles of diet. The exhibit consists of a series of one-hundred-calorie portions of various raw foods; the percentage of heat-giving, energy-producing and muscle-building elements they contain being indicated beside each. In this series perishable foods will be shown by means of models, the less perishable, as rice or oat-

meal, being represented by the actual substance.

RECENTLY the exhibition corridors and halls of the American Museum have presented, even to the casual observer, a very practical demonstration of the coöperation of the American Museum with the high schools of the city. Regent's week at the schools recurs twice a year and as only about one-half of the pupils can take the examination at one time, excursions are arranged to the Museum for lectures and laboratory work in biology. Upwards of five thousand pupils visited the Museum during the week. Each class attended at least one lecture, besides doing the laboratory work planned for. Lectures, illustrated with colored lantern slides and motion pictures, were given at intervals during the week by Mr. George H. Sherwood, curator of public education, Dr. G. Clyde Fisher and Mr. Paul B. Mann.

A COURSE of lectures open to school children will be given at the American Museum on Monday afternoons at four o'clock, beginning March 6 and lasting through April 10; on Wednesday afternoons, beginning March 8 and lasting through April 12; Thursday afternoons, beginning March 9 and lasting through April 13, and Friday afternoons, beginning March 10 and lasting through April 14.

MR. GEORGE K. CHERRIE will lecture on Friday evening, March 17, to the adult blind of Greater New York on "With Colonel Roosevelt on the River of Doubt." Mr. Cherrie was the naturalist detailed by the American Museum to accompany Colonel Roosevelt on the South American trip which resulted in the discovery of the River "Duvida," now named River Roosevelt.

THE first annual meeting of a society for the study of fish and reptiles will be held in the Museum on March 8 at 9.30 A.M. Papers are scheduled to be presented by Professor Ulric Dahlgren of Princeton University; Dr. Thomas Barbour of the Agassiz Museum, Cambridge, and Mr. Henry W. Fowler of the Philadelphia Academy of Natural Sciences. Messrs. Lang and Chapin of the American Museum staff will show slides of some of the interesting fishes and reptiles of the Congo region. This society has been formed with the object of bringing

ichthyologists and herpetologists into closer touch with one another for purposes of study and the advancement of science, and the meeting is open to any person interested in fishes, batrachians or reptiles. Professor Bashford Dean, curator emeritus of the Museum's department of ichthyology and herpetology, will be the first president of the society.

THERE has been prepared in the taxidermy laboratory of the American Museum of Natural History a life-size model of the extinct fishlike animal *Dinichthys*. This creature lived about twenty million years ago in the sea that existed on the site of the present state of Ohio. *Dinichthys* was one of the most ferocious animals that ever lived in the sea. Although like a fish in appearance it is regarded by scientists as belonging to a lower, more primitive order. Its head and the front half of the body were protected by heavy plates of bone, so that it swam about like an armored fish-cruiser. It was quite safe against attack by the other dinichthyids and by the sharks that lived in the same habitat. It had tremendously powerful jaws, with "fangs" in front, and behind these, knifelike cutters which chopped against each other. Five or six species of *Dinichthys*, ranging from two to fifteen feet in length, lived side by side in the Ohio sea. The species mounted (*Dinichthys intermedius*) reached a length of about eight feet.

AMONG the more important additions made to the collection of minerals, largely through the expenditure of the income from the Bruce Fund, are the following: a superb crystal of rubellite, (tourmaline), showing a parallel intergrowth of two individual crystals; a very showy, blue-green smithsonite, relieved by a white surface of crystallized calcite, from New Mexico; a plumose micaceous aurichalcite covering scalenohedral calcite, also from New Mexico; vivid yellow autunite in platy crystals, from South Australia; an opalized stem from Nevada of white opal with fiery foci distributed over it; curved, pink tourmalines in crystallized lepidolite from California; a unique specimen of amblygonite showing crystal faces; two remarkable specimens of mammillary or botryoidal cassiterite from Mexico; the rare parahopeite from South Africa and the minerals new to the collection, epidismine, fizelyite, jezekite, barthite and bavenite.

# The American Museum of Natural History

Seventy-seventh Street and Central Park West, New York City

Open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people. It is dependent upon private subscriptions and the fees from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Patrons.....	\$1,000
Sustaining Members (annually)...	25	Associate Benefactors.....	10,000
Life Members.....	100	Associate Founders.....	25,000
Fellows.....	500	Benefactors.....	50,000

**Guides for Study of Exhibits** are provided on request to members and teachers by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

The **Museum Library** contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The **Technical Publications** of the Museum comprise the *Memoirs*, *Bulletin* and *Anthropological Papers*, the *Memoirs and Bulletin* edited by J. A. Allen, the *Anthropological Papers* by Clark Wissler. These publications cover the field and laboratory researches of the institution.

The **Popular Publications** of the Museum comprise the *JOURNAL*, edited by Mary Cynthia Dickerson, the *Handbooks*, *Leaflets* and *General Guide*. The following list gives some of the popular publications; complete lists, of both technical and popular publications, may be obtained from the Librarian.

## POPULAR PUBLICATIONS

### HANDBOOKS

- NORTH AMERICAN INDIANS OF THE PLAINS. By Clark Wissler, Ph.D. Paper, 25 cents; cloth, 50 cents.
- INDIANS OF THE SOUTHWEST. By Pliny Earle Goddard, Ph.D. Paper, 25 cents; cloth, 50 cents.
- ANIMALS OF THE PAST. By Frederic A. Lucas, Sc.D. Paper, 35 cents.

### ILLUSTRATED GUIDE LEAFLETS

- GENERAL GUIDE TO THE COLLECTIONS. New edition issued December, 1914. Price, 25 cents.
- THE COLLECTION OF MINERALS. By Louis P. Gratacap, A.M. Price, 5 cents.
- NORTH AMERICAN RUMINANTS. By J. A. Allen, Ph.D. Price, 10 cents.
- THE ANCIENT BASKET MAKERS OF SOUTHEASTERN UTAH. By George H. Pepper. Price, 10 cents.
- PRIMITIVE ART. Price, 15 cents.
- THE BIRDS OF THE VICINITY OF NEW YORK CITY. By Frank M. Chapman, Sc.D. Price, 15 cents.
- PERUVIAN MUMMIES. By Charles W. Mead. Price, 10 cents.
- THE METEORITES IN THE FOYER OF THE AMERICAN MUSEUM OF NATURAL HISTORY. By Edmund Otis Hovey, Ph.D. Price, 10 cents.
- THE HABITAT GROUPS OF NORTH AMERICAN BIRDS. By Frank M. Chapman, Sc.D. New edition in course of preparation.

- THE INDIANS OF MANHATTAN ISLAND AND VICINITY. By Aldson Skinner. Price, 20 cents.
- THE STOKES PAINTINGS REPRESENTING GREENLAND ESKIMO. Out of print.
- BRIEF HISTORY OF ANTARCTIC EXPLORATIONS. Price, 10 cents.
- TREES AND FORESTRY. By Mary Cynthia Dickerson, B.S. A new edition in course of preparation.
- THE PROTECTION OF RIVER AND HARBOR WATERS FROM MUNICIPAL WASTES. By Charles-Edward Amory Winslow, M.S. Price, 10 cents.
- PLANT FORMS IN WAX. By E. C. B. Fassett. Price, 10 cents.
- THE EVOLUTION OF THE HORSE. By W. D. Matthew, Ph.D. Price, 20 cents.
- MAMMOTHS AND MASTODONS. By W. D. Matthew, Ph.D. Price, 10 cents.

### REPRINTS

- THE GROUND-SLOTH GROUP. By W. D. Matthew, Ph.D. Price, 5 cents.
- METHODS AND RESULTS IN HERPETOLOGY. By Mary Cynthia Dickerson, B.S. Out of print.
- THE WHARF PILE GROUP. By Roy W. Miner, A.B. Price, 5 cents.
- THE SEA WORM GROUP. By Roy W. Miner, A.B. Price, 10 cents.
- THE ANCESTRY OF THE EDENTATES. By W. D. Matthew, Ph.D. Price, 5 cents.





He has borrowed from the American his shirt and his overalls, but two centuries of contact with the white man and the white man's religion have not influenced the inward spirit of the Zuni

The cover of this JOURNAL is from a photograph showing preparations for firing a piece of pottery in accordance with the primitive but effective method of the Zuni Indian of New Mexico